



Both buildings in this St. Paul apartment complex appear identical but one is 15% more energy efficient.

Good Management Grounds High Heating Costs

ST. PAUL: From the outside, the building at 4909 - 55 Ave. in St. Paul, looks very much like its next door neighbour. Both four-storey walk-ups of white stucco and cedar are typical of the low-rise "affordable" housing which are landmarks in the cities and towns throughout northern Alberta.

Owned by St. Paul and Desjardins Rental Properties Ltd. the buildings were designed to be identical — 40 suites, a combination of one, two, and three bedroom units totalling 4 000 square metres (43,000 square feet). But soaring energy costs, which continued to escalate between completion of phase one and construction of phase two of the apartment com-

plex, prompted management to return to their drawing board to see what economies could feasibly be incorporated during construction of the second building.

The result is a building which is 15% more energy efficient than its twin and costs an estimated \$2300 less a year (based on 1983 energy costs) for heat and utilities.

Construction of the first walk-up was hardly complete when property manager Donald Bahnuik realized "We had to conserve somewhere or raise rents to compensate for the increase."

Bahnuik was convinced that a more energy efficient building wouldn't necessarily have to cost a lot more than the energy wasteful

one they had just put up. Improvements such as increasing insulation and upgrading the outer shell of the building, he believed, would result in any added cost being more than offset by a reduction in heating costs.

Fuel was less costly in the late 70s when the St. Paul project was planned. The cost of energy was one of the least significant consid-

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erations then, and Bahnuik said it was customary to produce relatively low-grade buildings and depend on the heating and other systems to make them comfortable.

Energy efficiency good business strategy

But energy costs have since become a major concern to the building owner who understands the concepts of life cycle costing, cost/benefit ratios and the inevitability of increasing energy prices.

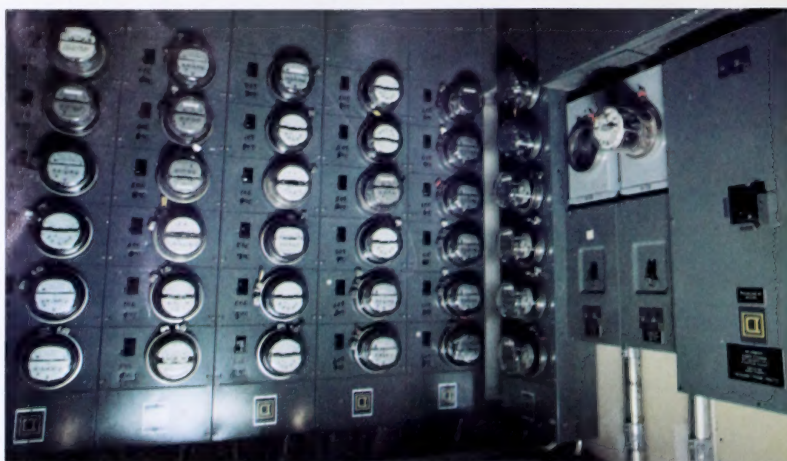
According to Bahnuik, heating costs for the phase one building averaged \$10 a suite in 1979 and quadrupled to \$40 per suite within five years.

"Under the circumstances, making the second building more energy efficient was just good business strategy," he said.

Dollars saved for tenants' services

Bahnuik reasons there are so many fixed costs over which the builder/owner has no control — taxes, inflation and interest rates for example — that present day economics dictate that to stay ahead of your competition you must control those things you can, reduce costs where possible, and allocate the dollars saved to other tenant services.

Other services, such as larger-than-average suites, full-time resident managers, modern fixtures are the result of this strategy, he said, and are the reason the occupancy rate of both buildings is presently holding at about 95%.



Tenants pay for their own utilities and each suite has an individual electric meter which registers the energy use for the specific apartment. To help tenants keep their utility costs low, the energy conscious management circulates energy conservation tips to residents suggesting such practices as lowering the thermostat at night or when they're away; turning off lights and the TV set when not in use; closing drapes to keep the cold out in winter and the sun's heat away in summer.

"Why heat the skies of St. Paul?"

To offset escalating operating costs, Bahnuik and building architect William Ross moved directly into high heat loss areas.

"We concentrated first on those areas we considered would give us the earliest and greatest returns," he said. "Insulation was an obvious opportunity to minimize heat loss. R12 insulation in the walls was standard for most buildings of similar type at the time," Bahnuik said, "but we thought, 'Why heat the skies of St. Paul?', so we opted for R20 in the walls and R50 in the roof and cut our heat loss through the building skin to bare minimum.

"We took a look at our air handling equipment and outside air

usage was thoroughly reviewed. We decided to install automatic timers on the make-up air return and heaters to turn off during the night and turn on again in the morning.

Manual timers easy to forget

"In phase one, exhaust fans in the laundry rooms and hallways were usually turned off manually at night and turned on again in the early morning to minimize heat loss. But that wasn't totally satisfactory. It's one of those little jobs that's easy to forget, or you get too busy with other matters. Heat loss from exhaust fans working unnecessarily can be high and there's also the cost of running the fan motors.

"In the new building, we installed automatic timers to turn off all air exhaust equipment not essential to tenants' comfort at 11 p.m. and turn it on again at 6 a.m. Most of the capital investment, which wasn't considered a big ticket item, paid for itself in reduced energy costs in the first year."

In looking for ways to cut operating costs further, Bahnuik and Ross decided to change the lighting sys-

Bathrooms in the apartment building are all equipped with modern energy-saving fixtures. Dial-a-temp taps reduce hot water wastage; water-saver toilets use 4.5 litres per flush instead of 10 litres required by standard equipment; and restrictive shower heads reduce water flow — and wastage of energy required to heat the water. A small expenditure was made to install shower restrictors in older model showers in the phase one building.



tems and equipment in the original plan and install new, more efficient light sources. They found too, they could cut back on lighting levels in non-critical areas with resultant energy and cost savings.

Less maintenance with fluorescent

Instead of incandescent fixtures which had been used throughout the first building, fluorescent lighting was installed. This move, Bahnuik said, was a significant money saver. Not only were fewer fixtures needed, the lower wattage lamps used less electricity. With fluorescent lamps, light levels are higher, the light is softer with less shadow, he said, and there was an immediate reduction in maintenance as the fluorescent lamps last at least six times longer.

All purely aesthetic or decorative lighting was eliminated from the plans; corridor lighting levels were reduced to 50% after 11 p.m.; time controls were installed to switch on lighting only when and where required in the stairwells, maintenance areas, and laundry rooms.

Exterior and parking lot lights are also controlled automatically, by photoelectric cell rather than on a fixed timer, and car plug-ins are connected directly to the individual suites so they can be controlled by the tenants and used only when they require them.

After the first building was con-



structed, new types of sliding double glazed windows had come on the market and were available in Alberta at reasonable cost. Installation of these improved windows and some design alterations to the balconies plus a rigid maintenance check and repair of all weather-stripping and caulking has sealed off heat leakage from the suites.

Another energy economy which resulted in substantial savings was the installation of gas rather than electric dryers in the second phase laundry rooms. According to Bahnuik, even though the manufacturers' price for gas models is higher than that of electric, a cost comparison favors the use of gas dryers.

Energy really matters in today's economy

"Each of these improvements was significant," Bahnuik said, "and the all round general 'air tightening' procedures helped immensely, but none was as significant as our new awareness of energy consumption and loss and the understanding that energy really matters in today's economic climate."

"Total energy consumption last year for phase one was 49 000 kW.h of electricity and 2 832 GJ of gas; phase two was 42 000 kW.h of elec-

Heat loss through gaps and cracks around doors and windows can represent as much as 30% of total space heating costs. A regular and frequent maintenance check is made of all doors and windows to make certain any air leaks are immediately sealed.

tricity and 2 452 GJ of gas. Now that's saving energy."

After the second phase was completed and had been occupied for several months, the building owners requested an Energy Bus Audit of the complex. The Energy Bus ener\$ave program is a service of Alberta Energy and Natural Resources offered free to business and industry in Alberta.

The computer analysis of the facility's energy usage provided by the audit indicated that the numerous changes incorporated in phase two had made it significantly more energy efficient. The audit team also pointed out some energy conservation measures which could



Another cause of energy wastage in the phase one building was found to be the hundreds of feet of pipe and several tanks left bare of insulation. Fibreglass insulated tanks were installed in the phase two building and all steam, hot water pipes and hot air ducts were wrapped with insulating materials. While dollar savings were not dramatic in the first year, insulation was economically justifiable on the strength of consistent energy savings.



Installing mixed temperature taps equipped with water saver nozzles in the kitchen had a threefold effect. It cut water consumption, saved energy in heating water, and tenants like the look, convenience and safety features of the modern faucets.

Energy Management Facts

Question:

There are many new devices on the market which claim to reduce your energy utility bill. Are these devices suitable for everyone's use?

Answer:

In the consumer market, the rule "Buyer Beware" must be the governing criteria when planning to purchase energy-saving devices.

When the cost of energy was rela-

tively cheap, facilities were built with little concern for the amount of energy to be used in their operation. Therefore, many buildings which were constructed during that period were overbuilt and have systems which use more energy than really necessary. In most cases, energy usage in such facilities can be reduced without adverse effects. For instance, light levels, water consumption, room temperatures, ventilation rates, can usually be

lowered for more efficient use of energy and may even improve employee comfort.

All of the devices that are available reduce energy consumption by reducing the energy output of equipment, i.e. less light output, lower water flow rate, cooler temperatures or less ventilation. However, not every device is suitable for everyone's specific situation.

Before you invest in a large quantity of any energy-saving device, it's wise to first purchase a few which should be installed and used under test conditions to be certain that the particular model of device gives satisfactory results for the specific application.

Judge the device's performance for yourself. You know best, the particular need of your operations.

Be certain that any energy-saving device you use is either Canada Standards Association (CSA) approved or has provincial regulatory approval.

Heating Costs Grounded

reduce some heat loss and reduce energy waste in the older building.

Bahnuk also credits the various energy efficiencies incorporated into phase two building plans with helping the developers secure addi-

tional proportional funding from the Alberta Home Mortgage Corporation.

"They recognized the long-term benefits of energy efficiency and wholeheartedly supported our energy conservation measures," he said.

As Bahnuk had predicted, the revisions to the building plans had not increased capital expenditures exorbitantly and cost/benefit projections indicated that payback times for the innovations were reasonable.

"If you build in improvements during construction, the cost is reasonable," he said. "When you do it after the fact, every change is priced by the piece and by the hour and can easily be 20 times as expensive."

"When you're building a million dollar plus building, a few extra thousand isn't noticeable. It's easier to part with the money and cheaper in the long run to change with the times and the market, than to have to upgrade after a building is finished."



Building designers cut back on lighting levels in non-critical areas to take full advantage of natural light where available. Timers turn on low-wattage lamps and required emergency and exit lights during dark hours but for the majority of time, sunlight streams through windows to light the open stairwell.



Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

*Please write to:
Energy Alert, P.O. Box 12058
Edmonton, Alberta T5J 3L2*



Energy Alert

October 1984, Number 10

Energy Costs Major Concern in City of Calgary

CALGARY: For many corporations in Alberta today, the cost of energy has become a major expenditure. In looking for ways to reduce their operating costs, many companies are initiating energy-management programs to use energy more efficiently and thus lower utility costs.

The City of Calgary, in this time of tight civic budgets, is one large corporation where energy costs had become a major concern. But active energy management is reversing the upward trend and substantially reducing yearly energy-cost projections.

The City of Calgary first launched an energy-management program in 1978. In 1982, each department became responsible for energy management within its own jurisdiction.

"Energy management is taking on greater importance in all our departments," says Glen Furse, City Energy Program Co-ordinator. "More and more departments are looking seriously at controlling consumption in their areas and asking for advice on how to improve energy efficiency."

Foad Barsoum, Energy Conservation Engineer for city-owned buildings, in co-operation with other department staff, carried out studies in buildings where savings potential appeared to be high.

Before making recommendations, it was first necessary to establish an accurate energy data base. Utility billing data over the previous five years was recorded and all information checked thoroughly.



CALGARY CITY HALL . . . In these times of tight civic budgets and escalating energy costs, the City of Calgary administration has substantially reduced yearly utility cost projections for several departments through an active energy-management program.

This proved to be a major cost saving as several discrepancies were identified.

"Above all, it is important to maintain accurate and complete records," says Furse. "Otherwise you are just guessing how much you're spending and you can't verify your energy savings."

Working with the City's Utility Departments and Canadian Western Natural Gas, the addressing and identification of buildings and meters on utility bills was clarified and also simplified to assist operating personnel to identify their specific building costs.

According to Furse, streamlining the system was like piecing together an elaborate jigsaw puzzle

and took two years to complete. "It was time consuming but the data base which is the result of this complex check was well worth it," he said. "Now, every bill carries a building name, street address, the City department responsible for the service, and an energy file number. Now, each department can see the effects of anything they do to conserve energy."

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Reaction throughout the corporation has been positive, according to Furse. "City managers are aware that they're accountable for department spending. Some components of departmental budgets cannot be

controlled by the managers. Nonetheless, the department heads can control, to some extent, energy consumption and end up by reducing energy charges in the process."

Following are three City-owned

demonstration projects where energy-savings programs were implemented. The information shown on the graphs illustrates the amount of reduction that is possible by concentrated energy management.

Timers Speed Up Drive for Savings

Manchester Vehicle Storage Building

One of the City's successful energy stories is the Manchester vehicle shelter where the annual cost for natural gas was cut by 62 per cent and for electricity, by 50 per cent.

Typical of industrial vehicle shelters, most activity in the garage occurs at start-up time in the early morning when trucks and heavy equipment are driven to job sites, and again at quitting time in the late afternoon when vehicles are parked for the night. Since the truck shelter was virtually empty for most of the day, energy-management staff reasoned there was no need for bright illumination or high temperatures. Similarly, exhaust fans were not required after the vehicles had moved out.

Leaving doors open after exiting presented another area of high energy usage. Understandably, drivers were concerned with the job of getting the vehicles on the road, and not with closing the door behind them. The end result was: interior lights were left burning during the day between early morning and closing time; unit heaters were turning on and off continuously to maintain a higher-than-necessary temperature; and exhaust fans were running constantly to provide needless ventilation.

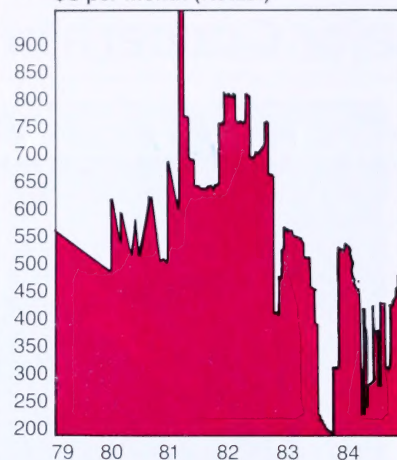
The first step was to check with Mechanical Services experts. Energy-management personnel needed to know — What is the minimum temperature at which the vehicles housed overnight in the shelter, could be expected to start readily? How frequently must air be exchanged to maintain an adequate standard of air quality? At

which locations should the lights be left on for safety and security?

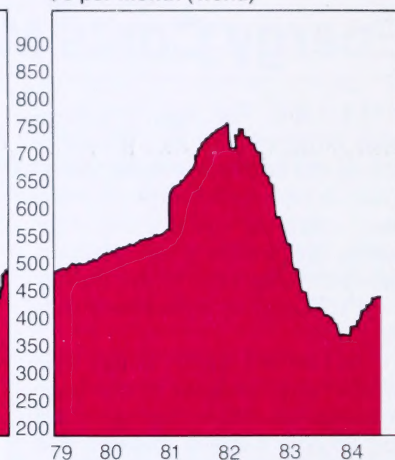
All the vehicles, mostly diesel-fuelled, could be started readily at 4°C, a temperature also considered acceptable to workers who are rarely required to be in the shelter for more than half an hour. Because vehicles leave immediately after being started, exhaust fumes in the shelter are not a problem so ventilation fans don't need to run continually. Except for some mandatory emergency lights, the banks of overhead fluorescent fixtures could also remain off.

Once these factors were determined, 7-day, 24-hour automatic timers were installed. Timers now turn lights on full in the early morning — about 6 a.m. in the winter — and reduce light levels to minimum at 7:30 a.m. when the vehicles have

ELECTRICITY
\$s per month (Actual)

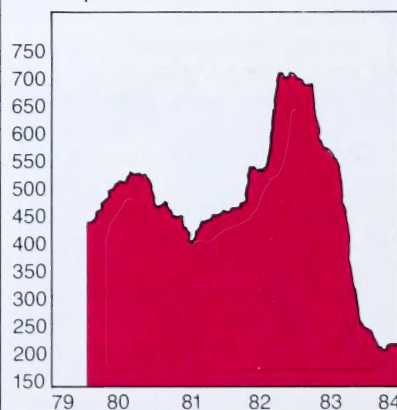


ELECTRICITY
\$s per month (Trend)



After automatic programmable timers were installed in 1982, monthly electric utility charges were cut by nearly 50 per cent despite increasing cost for electrical energy. The graph (left) indicates the actual cost of electricity per month during a 68-month period beginning January 1979, peaking at \$1,252 in 1981 and dropping to a low of \$225 in 1983. The graph (right) shows an upward trend in utility costs until 1982 and a steady decline after timers were installed.

GAS
GJ per month



Even more dramatic is the downward trend in the cost of natural gas since automatic controls were installed in 1982. The annual heating cost of this facility has been cut by 62 per cent.

gone. Ventilation exhaust fans are turned on automatically at 6 a.m., run continually for an hour and a half and then shut off. Thermostats are set to turn on heaters only when the temperature falls below 4°C.

The second step was to remount

thermostats closer to the ceiling, out of immediate contact with cold blasts of air coming in each time the shelter door opened. This meant thermostats didn't turn on the heaters as frequently.

The total cost was \$3,000, con-

sidered a minimal expenditure compared to the savings. "Electricity was reduced to \$5,300. That's half the cost of the previous year. Gas for heating was \$8,000. That's almost a third of what we averaged before," said Furse.

Fast Recovery with Power Factor Correction

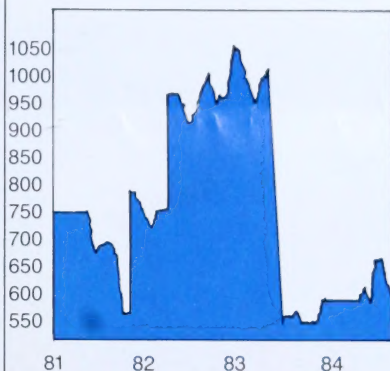
Sarcee Crusher Plant

The City-owned Sarcee crusher plant is one of the City's highest energy users. Here, over 100 induction motors drive heavy equipment that excavates, lifts, loads, and crushes rock into gravel.

Until recently, relatively little attention was paid to electrical efficiency at this plant. Emphasis was placed mainly on the horse power and the speed required to get the specific jobs done. The power bill for this plant totalled \$90,000 per year.

The introduction of the City's energy policy coupled with rising energy costs sparked a significant change in this attitude. The City of Calgary Electric System was asked to evaluate the plant's electrical usage. The plant's electrical loads were monitored for several days and

ELECTRICAL DEMAND
kVA



Peak demand dropped dramatically after power factor correction equipment was added in April 1983. A partial shut-down for renovations reduced demand in October 1981. Demand rose sharply in 1982 due to expansion of the facility and an increase in the City's street maintenance operations.

the results of the survey indicated a power factor of 62 per cent.

Simply stated, power factor is the relationship between the total power measured in kVA and the actual power in kW used by the in-plant electrical system.

Electric utility rates are designed to apply additional charges when a low power factor exists. This offsets some of their costs for supplying the additional power needed to serve low power factor loads.

After the survey, power factor correction capacitors were installed at a cost of \$17,000. "That investment will pay for itself in a matter of months," Furse said. "We not only saved on demand charges, in the process, the actual energy consumption will be reduced as a result of increased electrical efficiency." Furse anticipates that electrical costs will be reduced by \$28,000, approximately 50 per cent, with the installation of the capacitors.

Monitoring Temperature Ups Energy Efficiency in Centennial Planetarium

Centennial Planetarium

Don Parkinson, Building Maintenance Supervisor at the Centennial Planetarium, noticed some interesting facts when he started setting up his energy-management plan.

The heating, ventilating and air-conditioning system at the time was manually controlled and required maintenance staff to start up various operations at different times.

However, the hours the Planetarium is open to the public — holidays, weekends, evenings — do not correspond to the regular shifts of maintenance employees. Consequently, equipment would often be left on constantly. Analysis showed that shutting off the air-handling system for eight hours a day when the building was unoccupied would substantially reduce the electricity and the natural gas charges.

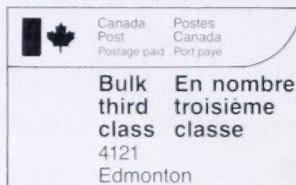
Parkinson recommended the replacement of the manual starter

and the installation of a timer to be programmed to suit the flexible requirements of this particular building. Additional controls to analyse various building heating and cooling zones and reset hot-deck temperatures were also installed. In the first year after the installation of the timer, the projected savings had been exceeded.

"A key point in an energy-conservation program," said Parkinson, "is to make sure you maintain an atmosphere that keeps people comfortable."



Published by Alberta's energy utilities and the Energy Conservation Branch of Alberta Energy and Natural Resources.



Once proper temperatures were determined thermostats were set and locked with covers to prevent anyone from tampering with them.

"Reducing energy needs in older plants takes a special effort and preventive maintenance is essential," he says. For example, the boiler is shut down every two years and a thorough inspection is made of the entire plant. This extends the life of the equipment and keeps it functioning at peak performance, which in itself saves energy.

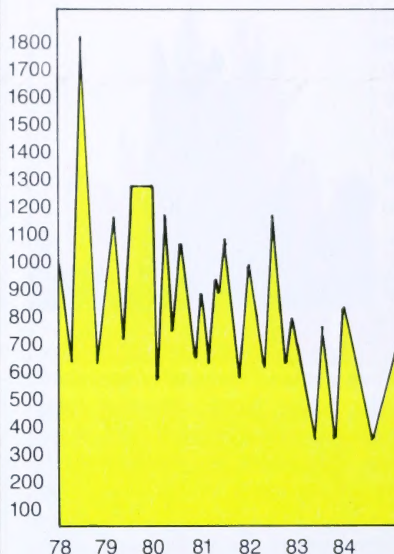
Parkinson discussed his energy-management plans and his commitment to energy conservation with a gas utility representative. The reduction in summer consumption no longer qualified the Planetarium for the high load factor rate. Their rate was changed to the optional rate which was more beneficial.

According to Parkinson, natural gas consumption in 1984 has decreased 40 per cent from 1978, representing a saving of almost \$15,000 per year. Electricity costs have not declined as dramatically, totalling \$3,000 savings per year, or 8 per cent.

Energy Program Co-ordinator Furse has high hopes for the City's energy-management program and says that the number of staff asking energy-related questions and seeking advice, indicates an increasing awareness and interest in energy conservation.

"Since the energy program policy revision of 1982, each of the 26 City departments has taken control of its own energy usage. Energy management is now a job function and I'm confident that each department will see that the job gets done."

GAS
GJ per month (Actual)



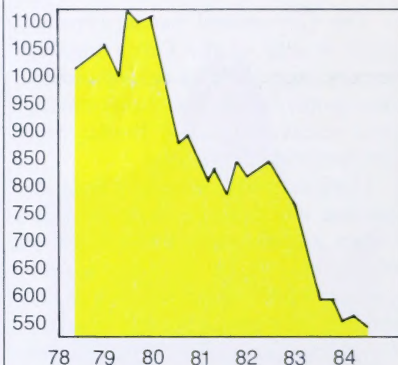
The Centennial Planetarium is heated and cooled by natural gas. Charting the consumption revealed that gas usage varied considerably from month to month. After automatic startup and timer controls were installed, natural gas consumption decreased by 40 per cent. In 1979, a lump sum billing is shown on the graph, equally proportioned at 1300 GJ over six months.

Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

Please write to:

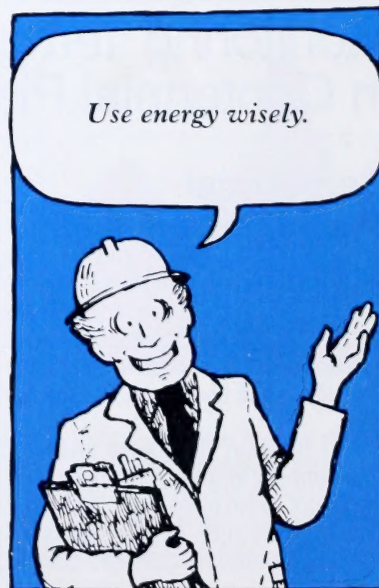
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GAS
GJ per month (Trend)



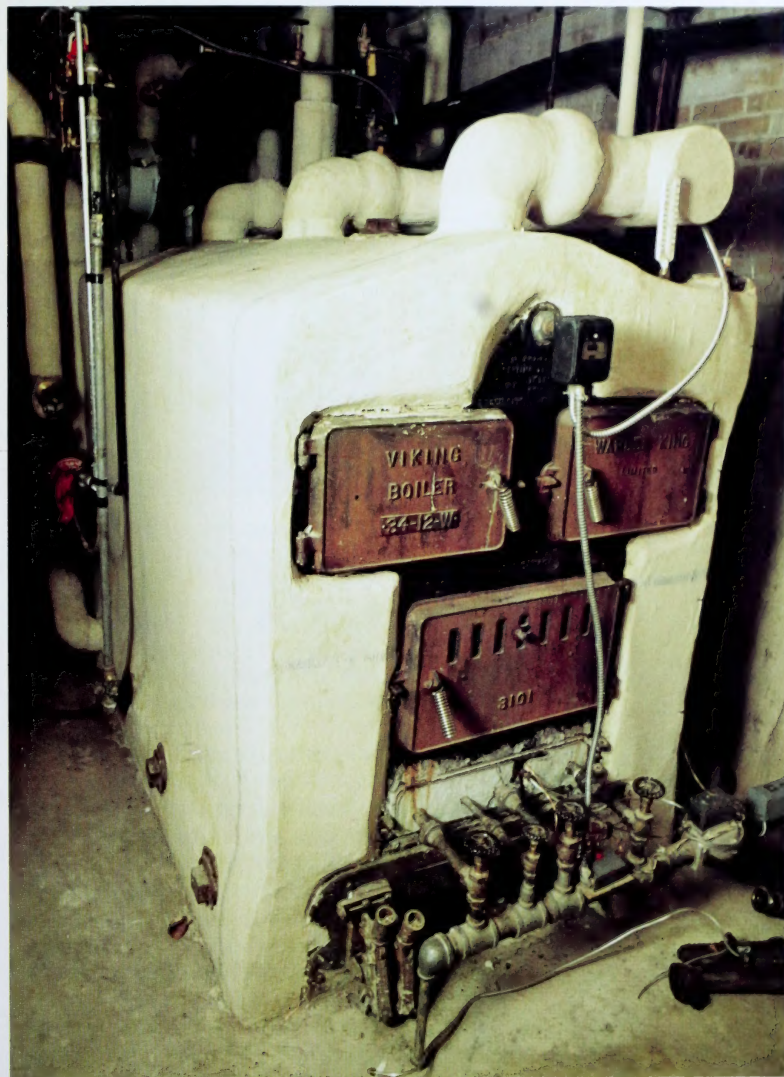
Automatic control of the gas-fired air-conditioning system (absorption unit), installed in 1980, reduced average energy consumption from 1100 to 800 GJs per month. The addition of other controls and rescheduling of some operations in 1982 resulted in a further drop in consumption to 550 GJs.

Use energy wisely.





Vintage Boiler Keeps Church Fires Burning



A new furnace or costly repairs seemed inevitable when a routine maintenance check of Strathcona Baptist Church's heating system revealed a crack in the forced-air heat exchanger. But a thorough inspection of the boiler, installed in 1905 to heat the original one-room church, showed the old boiler was being under-utilized and had sufficient capacity to heat the whole of the present building.

EDMONTON: At a time when "high tech" and computer-controlled equipment is playing such a large role in energy management, it seems a paradox that a vintage model boiler and the old-fashioned overhead fan could trim appreciable dollars off high energy costs. But two churches in Edmonton have found the old ways are good ways to save money on church operating costs.

Strathcona Baptist Church

Strathcona Baptist Church, with the present building's wings spanning four city lots and covering 2 130 m² (22,937 sq. ft.) of floor space at 104 Street and 83 Avenue, was originally a one-room building with parsonage next door. The small building and the minister's home were erected in 1905 to provide premises for worship on Sunday and other church services to a few families living in the town of Strathcona, now south-central Edmonton.

As the congregation grew, rooms were added: as the need for special services arose, wings were built on — an education wing in the '40s, a recreation/gymnasium wing in the '50s. In the mid '60s, the two older buildings were torn down and a new two-storey section with sanctuary, ministers' studies and administrative offices were built on the original site and adjoining the other previously built wings.

The church now ministers to 250 families; provides full service day care to 40 children; offers a variety

of programs to more than 80 church members who are senior citizens; and shares its facilities with the members of the Edmonton Korean Baptist church.

Just as the original church building evolved to a larger, more functional complex, the heating system too, underwent a metamorphosis. In 1923, an interconnected system of pipelines extending north and west from the Viking gas field brought natural gas to Edmonton and soon after, the church furnace was converted from a coal-fired to gas-fired hot-water heating system. When construction of the two-storey sanctuary and offices section was completed in 1964, a new forced-air furnace was installed to heat the new addition and the hot-water system was retained to continue heating the existing education and gymnasium wings.

"Gas was so cheap in those days," said Al Vickery, church treasurer and chairman of the property committee, "that heating the building was a minor operating expense. Based on dollars and cents, the cost of energy was not a concern."

Costs through the years have risen, however, and now, along with an annual review of the operating budget, an inspection of building efficiency is required which includes a check of heating and ventilating equipment, lighting, and all door and window seals. As part of the inspection in 1983, the property committee asked the gas company to conduct an energy audit of the building.

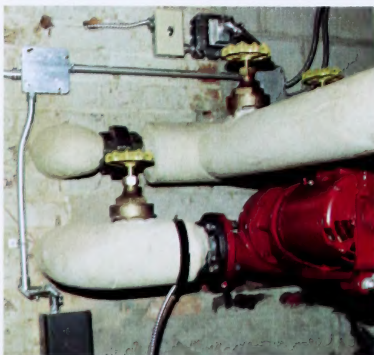
Among Alberta utility companies offering low-cost energy audits to customers who request them is Northwestern Utilities Limited. Although energy audits are primarily for their residential customers,

Northwestern, with the aid of an infrared scanner will also audit community buildings, churches and small buildings. Based on the inspection, an energy analyst prepares a written analysis and recommendations for improvement to minimize energy use.

Northwestern's audit included the recommendation that a thorough check be made of the forced-air furnace and boiler heating system. The follow-up action revealed there was a crack in the forced-air heat exchanger resulting in excessive gas consumption and longer running of the furnace fan.

"A new furnace was recommended. At the very least we'd have to replace the heat exchanger," Vickery said. "In either case, we were looking at a lot of money. And these are tight times."

Among members of the property committee are a professional engineer as well as some others whose work experience has made them knowledgeable of good engineering practices, Vickery said. "We looked first at a new two-stage furnace. That was going to be very expensive. We next checked out a replacement for the cracked heat exchanger. The cost for that was about \$5,800. We thought too about replacing the old boiler with an entirely new system which would heat all of the building. But when we checked into the old 1905 boiler we found it was being under utilized and had sufficient capacity to heat



New burner tubes and an 850,000 BTU heating coil were installed to convert the separate forced air furnace and hot water boiler heating systems into a single 4-zone unit and maximize the efficiency of the old boiler.



Destratification fans were installed in the ceiling of the two-storey sanctuary added in 1964. Modelled after the old-fashioned overhead fans commonly used in hot weather in the '30s, destratification fans save energy by forcing hot-air trapped at high levels down, instead of allowing heat to dissipate through the roof.

the entire building. In fact, we found the old boiler, simply because of its larger size, to be just two per cent less efficient than today's new models."

The decision was made to combine the forced-air and boiler heating systems. New burner tubes were installed and the boiler exterior and hot-water pipes were insulated with thermocanvas. An 850,000 BTU heating coil was installed carrying hot water from the boiler. A continuous fan passes air through the coil, transmitting heat to the sanctuary and office area through the forced-air system. All work was completed this past sum-

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mer by volunteer church members. The entire project cost about \$6,500.

"For less than a \$1,000 more than we would have paid to repair the heat exchanger, we were able to get a much superior system," Vickery said. "We have a four-zone system now, permitting us to turn off the heat in the sanctuary for example and turn it on when required for church services."

A mixing valve on the unit has a

sensor control which automatically adjusts air flow and saves energy. Vickery explained. Water circulates through the coil until the water temperature drops to 18°C (65°F), then is recirculated through the boiler. The boiler can be fired manually between 54°C (130°F) and 82°C (180°F) depending on seasonal conditions.

Vickery estimates total heating costs will be reduced almost 20 per cent this winter. In addition to the

13 per cent savings expected by resurrecting the boiler, Vickery said the church has already cut seven per cent from their energy costs by installing automatic setback thermostats, adding insulation and installing destratification fans in the sanctuary.

"We saved a lot of money too by doing all the labour ourselves, but the biggest money-saver of all is that old boiler — with us since the beginning back in 1905."

Ceiling Fans Lower Church Heating Costs

Ritchie United Church

Like many institutions, Ritchie United Church had humble beginnings — services began in the basement soon after the foundation was laid.

The year was 1945 and the Ritchie area, due south of downtown Edmonton was beginning to grow. Many young families were attracted to the old community which offered the advantages of a stable, quiet neighbourhood, "far enough but not too far" from the city centre with schools, parks, and churches planned to accommodate an increasing number of young children.

After the upper building structure was completed, the church bustled with activities — Sunday school, bible study, Scouts and Guides, Young People's Union, fellowship activities of all kinds — and activities continued with something going on every night of the week for the following three decades.

But, "things don't happen here like they used to," said Roly Relf, chairman of the property committee and long-time member of the congregation. During the last ten or more years there has been a steady decline in the population, he explained, because many of the young people, now grown with families of their own, have moved away.

There is no longer Sunday school and no young people's groups. The ladies of the church still meet once a month and there are special socials like the corn roast held in the



Ceiling fans installed in the sanctuary save on church heating costs and make an "amazing" difference to comfort of the congregation.

church basement one afternoon after Sunday service last fall and there's the occasional pot luck supper. But mainly, Relf said, the church is open for Sunday worship and some weddings and funerals now.

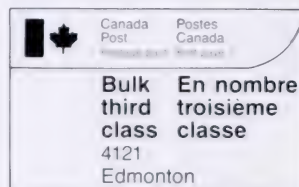
The congregation now numbers 70 families. Although the members

have declined in numbers, the enthusiasm of members hasn't waned over the years.

"We felt that with fewer people left to support the church, we would all have to pull together and whatever needed to be done, we'd do it together for ourselves," Relf said.



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Heating costs had become a major concern, he said, so Northwestern Utilities Limited was asked to do an energy audit of the building and recommend some improvements which would help save money on the gas bills.

"The energy analyst showed us how heat was trapped in the high ceiling of the sanctuary area. It was just sitting up there heating the ceiling and eventually escaping through the roof. He suggested we install overhead fans to force the hot air down to where the people are.

"We got a very good deal on three ceiling fans, just \$130 each, and some of us men installed them ourselves. It's just amazing how much more comfortable it is sitting in church now."



Using an infrared scanner — an instrument designed to see heat in the form of long-wave length infrared radiation — Northwestern's energy analyst sees where heat is escaping through sanctuary ceiling.

There were other simple things recommended which could make a big difference. For example, cold air was rushing in through seams joining the stained-glass window sections. Caulking could prevent this, however, the type of hinged casement window in the church, vertical stained-glass panel in

which only the bottom portion opens, is not easily caulked using the normal methods of caulking and weather stripping.

The analyst suggested sealing the windows in winter with felt strips which can be removed in warm weather so the windows could be opened again to let in fresh air.



Hinged-casement window is sealed with felt strips to prevent drafts in winter.

The audit revealed that the major heat loss was through the basement walls which had no insulation between the concrete foundation and the interior panelling. The men of the congregation, doing all of the work themselves, first removed all the wood panels, then installed R12 insulation.

The result was "dramatic" according to Relf. "Before, we were heating the basement first and about 40 per cent of it was escaping. Now, more heat stays in, rises upstairs instead of outside. You can actually see the difference. Before we insulated, in winter, snow on the ground outside would melt for about six inches from the building exterior walls."

The church members also monitor closely all thermostats, setting the temperature very low when the building is unoccupied and

turning the heat up for services and other functions. The hot water tank too is set at 50°C (123°F) except when hotter water is required for washing dishes and cooking when there is a banquet or reception.

Since implementing the various recommendations of the gas company audit, Ritchie United Church has steadily reduced the energy consumption and cost of heating.

"We're keeping a close check on everything, making sure maintenance is kept up, like cleaning the furnace filters and replacing weatherstripping and caulking as needed. All these little things are making a big difference and now we have fewer people left to support the church we feel that any little thing we can do to save energy will save money, and that will be a big help."

Energy Management Facts

It is not usually necessary to maintain a constant temperature when buildings are unoccupied. Setting back the thermostat is one of the simplest and most effective methods to reduce energy consumption and cost.

A setback of between 2.8°C and 5.5°C when buildings are unoccupied is typical, although many commercial operations can be setback by as much as 8°C for even further savings.

The amount of energy required to return the building to normal operating temperatures is much less than the energy required to maintain the building temperature at a constant level.

The longer the setback period, the greater the savings will be. Cost savings of setback systems vary, depending on building insulation, climate, length of setback period and number of degrees of setback. Thermostat setback, whether by manual or automatic controls, will reduce energy costs between 1 to 1.8 per cent for each Celsius degree of setback over an 8½ hour period. Automatic controls require a minimum setback period of four hours to be cost-effective.



Energy Alert

April 1985, Number 12

Board spends money to save money

Capital Investment Nets Major Savings

VEGREVILLE, Alberta: "We knew we were saving money but we couldn't believe it was so much. We're still asking ourselves, "Did it really happen?"

Wilda Wedgerfield, administrator of the Vegreville Auxiliary Hospital and Nursing Home was commenting on an estimated 50 per cent saving in electrical cost and 35 per cent saving in natural gas costs at the 2 296 m² (22,800 sq. ft.) facility in the year since launching its energy-management program.

About \$35,000 was spent to upgrade, modify and make "air-tight" the 22-room nursing home and connecting 30-room auxiliary hospital — an investment the Board of Directors of the senior citizens' complex expects to recoup within 17 months.

Examining their total expenditures for utilities over a one-year period, Vegreville Auxiliary Hospital and Nursing Home found that controlling their energy usage had netted them substantial savings.

"Comparing last month to the same time last year, our costs for utilities were way down," Wedgerfield said. "This was even more surprising because we had installed new equipment, including a large capacity 8 kW (10 hp) washer and a new gas-



At the Vegreville Auxiliary Hospital and Nursing Home, a senior citizens' complex 100 km east of Edmonton, light level over the nursing station was improved by 25 per cent after diffuser panels were installed to spread the light from fluorescent tubes.

This issue of ENERGY ALERT is one in a continuing series of energy management newsletters published quarterly by Alberta's energy utilities and the Energy Conservation branch of Alberta Energy and Natural Resources.

fired high-speed dryer which we expected might increase the energy demand as well as our total energy consumption."

A review of their energy bills showed gas consumption had been reduced by 1450 GJ, dropping from 9950 GJ in 1983 to 8500 GJ in 1984; electrical usage from 330 400 kW.h in 1983 to 289 700 kW.h in 1984. This was achieved even with the addition of the high-energy consumption washer and dryer.



Installation of an 8 kW (10 hp) washer and high-speed gas-fired dryer were expected to increase energy usage but practising energy management offset the additional load. Laundry-room staff begin work an hour earlier to help control peak electrical demand.

Much of the drop in cost for the hospital/nursing home's utilities is due to reduced water consumption, Wedgerfield said. "Our water is piped here from Edmonton, 100 km west of here," she explained, "and our rates for water are high—about three times higher than similar operations in the City of Edmonton are paying. The installation of simple, inexpensive toilet tank dams is saving us a gallon of water per flush and we've also cut water consumption with flow restrictors in some taps.

The energy-management program was initiated by administrator Wedgerfield and directed by maintenance supervisor Nick Wysocki following discussions with the Board of Directors. "We were running worrisome deficits in both buildings and were looking for ways to cut operating costs," Wedgerfield said.

Although higher prices for electricity and gas are contributing to in-

creased operating costs, Wedgerfield said that advanced technology is an even greater factor, causing the facility to consume more energy today than at any time in the previous 20 years. The auxiliary hospital was built in 1965 and the nursing home in 1970.

The Board decided the first step was to determine the present operating characteristics and energy use of the complex. "Obviously, some cost and energy-conserving opportunities, feasible for other operations, just aren't

practical in a home for the elderly," Wedgerfield said.

An energy audit by Alberta Energy and Natural Resources' Energy Bus was the first step. It showed that the complex could reduce energy costs by 11.8 per cent—nearly \$6,000 annually based on current energy prices—with a minimum investment. For example, about \$2,400 a year could be saved simply by eliminating air leaks from the kitchen, office and washroom exhausts. Using low-wattage fluorescent tubes as existing ones burned out plus converting some incandescent lamps to fluorescent would save another \$1,900 a year. Weatherstripping, temperature setback and some minor equipment adjustments would save even more.

While the Board agreed the suggested improvements would cut the energy load considerably, they felt projected increases in energy costs might offset the estimated savings in actual dollar terms.

Nevertheless, Wedgerfield and Wysocki encouraged staff to be energy-conscious and to implement many of the no-cost suggestions made by the Energy Bus audit team. As a result, the 96 people working at the Vegreville complex dutifully turned off lights when and where they were not required, turned down thermostats when feasible, and shut off exhaust fans when going off duty.

A small expenditure was made to install flow restrictors in certain taps and for temperature controls in specific locations.

As well as the Energy Bus audit, the Board considered an energy conservation proposal submitted by a private consulting company. This proposal suggested extensive renovations which included replacing all incandescent lighting, installing double-glazed windows and other methods of air-sealing the building, and purchasing equipment to reduce water consumption.

The Board considered various options carefully during the period between May and the new year but in the end decided to "spend money to save money", Wedgerfield said.



Before deciding on an energy-management program, Board members discussed proposals from various sources. Here, maintenance supervisor Nick Wysocki (left) talks with Alberta Power's superintendent of energy management, Jerome Chepyha.

"We calculated that by spending \$35,000 for renovations we could cut our utility costs by \$25,000; the pay-back period would be 17 months; and the return on investment could be 72 per cent. Even so, the Board wasn't convinced that spending that much money to save energy was the right thing to do."



The complex was overlit in 90 per cent of the areas where lighting was required. Lighting consumption was halved with such simple energy-conserving measures as disconnecting every second fluorescent fixture in all hallways.

Some members were skeptical at first, Wedgerfield said, but in February the majority agreed to a capital investment totalling \$34,967 and work began immediately.

As a result of an analysis of the electrical system, which indicated the complex was overlit in 90 per cent of the areas where lights were required, lighting improvements were a major priority. Lighting consumption was halved by removing or disconnecting every second light fixture in all hallways, eliminating some lights in patient areas, and replacing 98 incandescent fixtures with fluorescent fixtures and similar energy-conserving measures.

Diffusers were installed in some locations. At the nursing station, that move improved light level 25 per cent. Circle fluorescent fixtures replaced incandescent lamps in the occupational therapy room and patients' lounge, producing adequate lighting with 20-watts where two 60-watt lamps had

been used previously. Incandescent lamps in patients' rooms did not warrant the cost of replacement. However, fluorescent fixtures were installed over patients' beds for better lighting and economy.

As well as converting incandescent to fluorescent lamps throughout the complex, ballast add-on devices were installed in 313 of the fluorescent fixtures. This measure reduced lamp output of each fixture by 33 per cent.

Commenting on this procedure, maintenance supervisor Wysocki said the add-on devices are claimed to also increase tube life up to 50 per cent in some cases and also keep lamp ballasts cool, prolonging their life as well. "But," he warned, "these devices should be used only in areas that are substantially overlit, as was the case here."

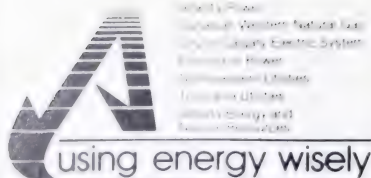
He said, "We got carried away using them, though, much to the dismay of the nursing staff." Nurses working at the nursing station, for example, complained after their area light output had been reduced because they were no longer able to see well enough to read and do their other work. "We removed the devices at the nursing station and lighting there is now operating at full output again," Wysocki said.

Most exterior incandescent lamps, including parking lot lights, were replaced with high pressure sodium (HPS) vapor fixtures. For example, five incandescent lamps at each entrance to both buildings were replaced with two HPS fixtures to give the same amount of light. In total, 27 incandescent fixtures were replaced by 16 HPS. Because of the longer lamp life of HPS, maintenance costs were also reduced by the changeover.

(cont. page 6)



Existing doors were made air-tight with spring-loaded door sets to wooden frame doors (left); self-adhesive fin pile to metal frame doors.



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(cont. from page 3)

A major expenditure was for measures taken to reduce air infiltration, exfiltration, drafts, and dust. Thermopane, double-glazed windows were installed in a number of critical areas. Existing doors were made air-tight with the installation of spring-loaded, durable door sets to wooden frame doors; self-adhesive fin pile to metal frame doors. The periphery of all other door and window frames was caulked and weatherproofed; worn pile replaced at intersecting points and between sliders; faulty seals, thresholds and sweeps on all exterior doors replaced.

Less costly, but also effective, were the energy-management measures taken to reduce exhaust levels such as monitoring and curtailing the running time of all fans and make-up air intake.

"Dietary and laundry room staff assure exhaust fans are shut down whenever possible. Laundry staff also



All outside wall electrical outlets were insulated and fitted with draft eliminators to prevent infiltration.

come to work an hour earlier than before so that laundry is finished before other electrical loads start up, to help control peak demand." Wedgerfield said.

"We're also looking at our computer system to see if we should adapt it for energy management. Although its use is primarily for safety, security, accounting and other records, we could add the necessary software to record our energy usage for about \$600. Eventually we'll computerize our energy management too."

Total cost of all these changes was substantial but Vegreville Auxiliary Hospital and Nursing Home has cut their energy consumption and their costs significantly in the past year and even bigger savings are expected in 1985.

Reflecting on the year just past, Wedgerfield said, "We're so close to our energy-management program that sometimes we forget how well we've done. At year end we'll prepare a report on what we've accomplished. Then it will be a matter of record. It really did happen."

She also said, "Because of good energy management we're going to cut our deficit. Other similar facilities should have a look at energy management in relation to their operation. There are so many things that can be done to control energy consumption, and when you do that, you also cut operating costs."



Looking to the future, the Board of Directors at the Vegreville Auxiliary Hospital and Nursing Home are planning to program energy management into the security computer system.

**DID YOU RETURN
THE QUESTIONNAIRE?**



Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

Please write to:

*Energy Alert, P.O. Box 12058
Edmonton, Alberta T5J 3L2*

When computers first came on line in the 1950s and 1960s, only the largest of corporations could afford to install a computer. During the '70s, the development of the micro-processor rectified the market price and many of the large- to medium-size businesses in Canada purchased various computer packages. By the end of the decade, improvements in design and the development of simplified systems made automation

of general accounting functions commonplace and data-processing successes abundant.

Computers in the classrooms of the '80s spawned a computer-literate generation and graduated a new class of skilled users prepared to tackle more complex business problems such as optimizing human resources and improving management decision-making tools; increasing the efficiency of building operations; and

streamlining energy utility control systems. With the aid of computer technology, today's building owners and operators are paying very close attention to the amount of electric and gas energy they use as well as where and how much they can save.

The advance of the computer opened new avenues to the commercial and industrial community, leading building owners and operators to rethink their energy-spending ways.



Energy Alert

July 1985, Number 13

Computer Controls Energy Costs



The master control panel, shown here, is the computer's brain.

LAKE LOUISE, Alberta: A computer, affectionately dubbed Stan Jr., has managed to reduce energy consumption by 22 per cent at the Lake Louise Inn. Introduced to the mountain resort in April 1984, the computer control system saved \$14,000 in energy costs in the first nine months. Within its second year of operation, Stan Jr. is expected to

have paid back in savings the total \$42,000 cost of installing the system.

Stan Jr. is the brainchild of TransAlta Energy Systems but the man behind the computer's unique programming and its acceptance as undisputed master of energy control at the Inn, is comptroller Larry Hoskin.

"We realized we were spending too much money on energy, so I tried to track our energy consumption and translate the energy usage into actual money costs. The problem I faced was I didn't understand the utility bills. Those little pointers whizzing around on all those dials obviously meant something but I didn't understand what they meant in relation to the amounts showing on the monthly statement," Hoskin said.

Hoskin called on the Inn's electricity supplier, TransAlta Utilities, and a representative sat down with Hoskin and explained the demand billing system used by Alberta electric utilities, which bases charges on consumption and demand. Consumption is the actual amount of electric energy used during each billing period and is measured in kilo-

watt hours (kWh); demand is the rate at which electric power is drawn from the utility system and is measured in either kilowatts (kW) or kilovolt-amperes (kVA).

The utility representative likened the demand billing process to the purchase of an expensive automobile that is used at high speeds for a few moments only once in a while. He explained, suppose you buy a car that cost \$30,000 and is capable of speeds up to 150 kmph. You drive the car at 150 just once and for only a short distance. If you leave the car in the garage for the next month and don't drive it at all, it's still the same expensive car and it's still capable of high speeds, and if you're buying it by instalments you're still putting out the same monthly payment.

With a car, you're paying in part for its peak performance capability.

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With electric utilities, you're also paying for peak performance capability and for the assurance that the next time you demand it, that same amount of power will be available.

Simply stated, electrical demand charges are based on your highest established demand for power and for the assurance that, when necessary, that same demand for energy will be available when needed in future months.



The man behind the computer's unique programming is the Lake Louise Inn's comptroller, Larry Hoskin.

Once he understood the monthly statement, Hoskin said it was easy to see how the charges were calculated.

"Having learned how to measure it, we decided to control it and to do something to curb energy waste."

The Lake Louise Inn is a four-building complex situated in the Rocky Mountains at an altitude of 1524 metres (5,000 feet). It has a total of 186 guest rooms spread over a 3.2 hectare (8 acre) site. A two-building motor hotel complex is referred to as the Inn. It has 91 guest rooms and houses most of the recreational, conference and service facilities. The Hostelry has 56 rooms with shower facilities and laundry, a communal lounge with fireplace, pizza parlor, games arcade and TV room, and ski repair area. The Lodge is a condominium complex with 39 one- and two-bedroom chalets with individual kitchens and living rooms and each chalet has its own furnace.

As a first step in cutting energy costs, Hoskin said the management carefully assessed the building. "We checked for air leaks and made sure

all weatherstripping and caulking was in good repair. We sealed every door frame inside and out. We installed flow restrictors in all shower heads. We installed ceiling fans to circulate the air. We put automatic timers on some of the air exhausts and on some lights; installed oscillating controls on individual furnaces in the chalets; covered the pool and jacuzzi each night; set back the domestic hot water temperature.

"All those traditional methods undoubtedly made some difference, but still our energy costs seemed exorbitant. Then we realized, it was our erratic peak demand that was costing so dearly."

Having exhausted the traditional energy-saving methods, Hoskin agreed to look at a computerized building control system by TransAlta Energy Systems, a division of TransAlta Resources, a subsidiary of TransAlta Utilities Corporation, which would monitor and control energy uses throughout the Lake Louise complex. The panels and controls used by the company are the same for all systems but the programs for each system are unique and designed specifically for the



Destratification fans mounted on the ceiling force trapped hot air to lower levels; a computer program dims lights in the dining area when not required.

needs of the buildings they are to control.

The custom-designed control system for the Inn consists of a terminal in the office and a master control unit and two "slaves" in the Inn



In an attempt to cut energy consumption, management made sure all traditional energy-saving methods had been tried before they agreed to look into investing in a computerized building control system. The computer controls water temperature of pool and jacuzzi. Air exhaust and humidity are automatically controlled by the computer and a plastic bubble mat covers pools at night to cut down on evaporation and heat loss.

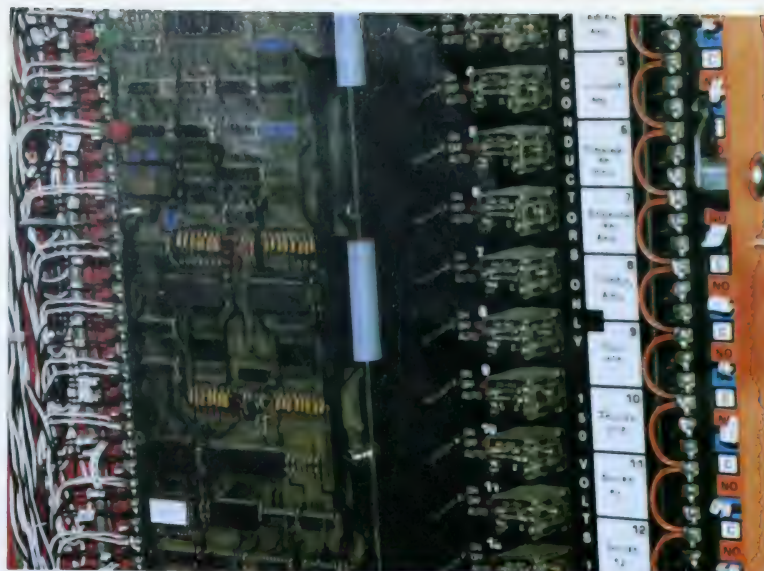
and the Hostelry. It was not considered cost-effective to computerize the chalet units of the Lodge at this time; however, should energy costs increase significantly in the future, this building too could be readily incorporated in the building control system.

The strategy, according to Hoskin, was to co-ordinate the routine functions such as monitoring the operation of all systems — “that was easy”; to also control periodic functions such as warming up a meeting room before delegates arrive, automatically adjust the heat, condition, clear and provide fresh air during sessions, as required — “that’s a fantastic feature”; and to alert staff to any imminent malfunctions — “that alone, if it prevents even one catastrophe, will be worth the investment.”

Hoskin says Stan Jr. is a real workhorse, not unlike Stan Sr., the human maintenance superintendent who has been with the Lake Louise complex for several years. Stan was skeptical at first, Hoskin said. “When we first logged on, he continued his routine checks, just to be sure the computer was doing things right.”

The heart of the system is the central control console where all instructions are entered and data retrieved. The terminal display and printer are located in the office of the Inn and the major panel is in the boiler room. A telephone hook-up from the Inn to TransAlta Energy Systems in Calgary records all data in both locations. Should anything occur to accidentally wipe out the information stored in the computer’s memory, the office in Calgary can retrieve the information and input it again at Lake Louise.

There are 16 programs currently entered into this system and others will be added as required. A major convenience and big energy saver, says Hoskin, is the computer’s ability to start and stop equipment according to preset schedules. It closes dampers, turns lights on and off, and reschedules temperatures from occupied to unoccupied levels. Some of these functions were previously controlled by automatic timers. The



The heart of the 16-program system is the central control panel shown above. (Bottom right) Larry Hoskin shows a less complex slave panel. Battery at bottom of picture supplies emergency electricity in event of power outage. (Bottom left) The terminal display and printer give up-to-the-minute readings of all conditions and can recall comparative figures for any date and time.



timers are no longer necessary in the Inn and Hostelry but have been put to good use to control several building operations in the non-computerized Lodge area.

A load-shedding program is used in conjunction with the start/stop program to shed non-essential loads when peak demand is approached. For example, when a peak electrical load is predicted, equipment is shut down on a priority basis. Non-es-

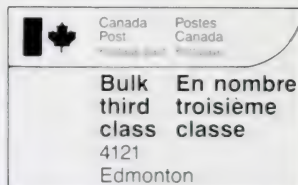


sential things are cut off first such as the swimming pool heater, then the car plugs. A major concern at the Lake Louise Inn is not to interfere with guests’ comfort and therefore the priority system is based on doing first those things which will most likely not be noticed by the guests.

Another program controls equipment and functions such as ventilation, incoming air according to load



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With the aid of computerized energy-management, the Lake Louise Inn reduced its energy consumption by 22 per cent in the first nine months of operation and anticipates saving 13 per cent more after approximately 18 months.

needs and outdoor temperature, and also modifies the pool and jacuzzi water temperatures.

The computer generates an alert whenever upper or lower limits for any points being monitored by the system are exceeded. It also monitors the number of hours each major piece of equipment has been run and reports when a preset number of hours or operations is reached so that maintenance can be done. Even daylight saving and standard time changeovers are programmed into the computer. Information on outdoor temperatures, snow and ski conditions are stored in its memory and printed out when required.

Hoskin said the \$14,000 that the computer control system saved them in the first nine months was a small amount compared to what he expects will be saved in future.

"Now that Stan Jr. is controlling our demand, we expect even more dramatic savings. The initial outlay will have been paid back several months earlier than the two-year

payback we expected and indications are that our savings in energy consumption could go as high as 35 per cent by next year.

"Besides the fantastic savings, Stan Jr. is a lot of fun to work with."

Energy Management Facts

Control of exhaust fans, especially in unoccupied areas, is an extremely effective way to save energy. Major savings are achieved by reducing the amount of natural gas needed to heat outside air. Minor savings are also gained by reducing the amount of electricity needed to operate motors.

When air is exhausted from a heated area, it must be replaced, usually with outside air

supplied by a make-up air system or with air leaking through joints, cracks, or gaps around doors and windows. The temperature of exhaust air is typically 20°C. During heating season, outside air is considerably colder and air entering a building therefore must be heated to raise it to 20°C.

The following examples illustrate the value of proper exhaust fan control.

1. A commercial/industrial site has a 1,000 CFM* (472 l/s**) fan running continuously. Reducing operating time to 50 hours per week would result in a saving of approximately 300 gigajoules of natural gas per year.

2. A residential bathroom fan runs continuously at 50 CFM (23.6 l/s). Turning it off with the light switch would save approximately 20 gigajoules of natural gas per year.

* CFM cubic feet per minute

** l/s litres per second

THANKS TO OUR READERS

Response to the Energy Alert Readership Questionnaire which appeared in the previous issue, April 1985, number 12, was most gratifying and we want you to know how much we appreciate the time and thought you gave to each of our questions. Your comments and advice are currently being evaluated and when appropriate we'll do our best to incorporate your valuable suggestions into future issues.

Of particular interest:

56% read every issue thoroughly
93% rate Energy Alert useful
83% read the Energy Management Facts in addition to the case history.

And especially gratifying:

61% share Energy Alert with their staff
75% now practice energy management at business and at home
74% are now more conscious of the need for energy management.



Big Energy Savings in Transit System

EDMONTON, Alberta: In three short years, Edmonton Transit has performed a dramatic turnaround, stopping the accelerating costs of energy usage by this division of the city's Transportation Department and bringing its operating budget into line. At one of its facilities, the Ferrier garage, Edmonton Transit severed 37 per cent from its utility bills and reduced the overall energy consumption of the system's seven garages and eight light rail transit (LRT) stations by a commendable 29 per cent.

The campaign to save energy was sparked in 1981 by City Council's decree that each department cut back on spending, according to Paul Salvia, Transit Plant Engineer.

"We had to save money. A large part of our budget was being spent on utilities. We decided to look at

our use of gas and electricity to see if we could reduce costs in that area," he said.

CITY INCENTIVE

Edmonton Transit's energy conservation activities were encouraged by a process of management/employee consultation, and by well-informed policies designed by the City of Edmonton Energy Management Committee. Recognizing the benefits of energy conservation, the City of Edmonton, in 1978, established the Energy Management Committee which encourages employee involvement in programs aimed at alleviating excessive use of energy.

A fundamental objective of the city committee is to have each department develop an effective energy management program and practice wise



Daily washing of Edmonton Transit bus exteriors was cut back to twice weekly service and rescheduled from a night to day shift operation. Although intended to save on cleaning costs, the measure also substantially reduced energy consumption.



Ferrier garage, built in 1976, is primarily used for bus parking and minor engine maintenance. Building layouts differ as do the purposes for each of the system's seven service garages.

and efficient energy usage. Guidance in evaluating in-plant energy efficiency is offered and each department is required to establish on-going energy management programs, implement practical energy-saving measures, monitor and report results. At the instigation of the committee, energy management programs are

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active in every sector of the municipal government.

NO COMPARISON

Paul Salvian faced a familiar problem when he started setting up Edmonton Transit's energy management program. A utility tracking system for analysing gas and electric bills for each of Transit's facilities showed similar curves when compared with degree days (the colder the temperature and darker the day the higher the energy consumption) — but analysis showed vastly dissimilar inclines and downgrades when compared to each other.

Salvian explained, "Each building has its idiosyncracies. Floor plans and layouts differ. Some buildings are old; some are new. They're each used for different purposes. Some are mainly storage; some house heavy maintenance shops; and others are for passenger waiting areas."

But Salvian was "deeply committed to an intensive Energy Management Program" and was determined to control energy consumption and lower utility costs wherever practical throughout the division.



Paul Salvian, Transit Plant Engineer (right) and Fred Robinson, Equipment Supervisor (left) check progress of energy management program at Ferrier garage.

Preliminary calculations in 1981, Salvian said, showed that collectively, utility charges for Edmonton Transit's several facilities accounted for approximately \$1.8 million. One significant report, that year, noted an energy bill of \$193,700 at one location, the Ferrier garage, which houses 225 buses of the transit's fleet



Ferrier garage, shown here, had an energy bill of \$193,700 in 1981. Lighting has since been halved; air exhausts which ran continuously have been cut back to six hours daily; and vehicle servicing and cleaning operations have been moved to day shifts, resulting in a startling reduction in energy consumption and costs.

of 700 buses, vehicle washing equipment, and a small body and maintenance shop. Using the Ferrier garage for a test run before implementing changes across the system, Salvian first requested an Energy Bus audit. Alberta's Energy Bus is available, at no cost to the client, to provide a cursory look at a plant's overall energy efficiency, and to point out the areas where energy — and energy-related dollars — can be saved.

The audit, in July 1982, identified a potential dollar savings at then current prices of \$38,733.

AIR CONTROL SYSTEM IMPROVED

The audit pointed out the desirability of installing automatic timers to control both exhaust fans and heaters in the bus parking area as well as isolating the air exhaust system from the heating process. Prior to the audit, exhaust fans ran continuously. Although the Ferrier garage is open 24 hours daily for various operations, the time during which bus motors are running inside the garage totals only about eight hours each day and is governed by transit rush hour schedules. For example, buses start running about 5:30 a.m. and most are on the road by 7:30 a.m. Many return after 9 o'clock and are parked

until the next peak time in the afternoon at 2 p.m. When the buses return to the garage in the evening, the majority remain parked overnight. Others are serviced during that time.

Ferrier garage Equipment Supervisor, Fred Robinson, said that after the audit, automatic timers were installed and set to operate the exhaust fans during those hours when the buses start up and when they come back into the garage. The total number of hours exhaust fans are in operation was reduced from 24 hours a day to eight, "and the savings were significant."

Since then, Robinson said experience has shown that the hours of operation could be reduced even further and that just six hours of daily operation of the exhaust fans is sufficient. Operating the air supply/exhaust during the periods of heavy bus activity has not caused any fume problems in the off-peak hours, Robinson said. The HVAC system is controlled by a timer which also controls the operation of the outside air dampers so that the fresh air mode is called for only when the exhaust fans are on, he explained.

The Energy Bus audit also estimated that lighting costs could be reduced by more than \$23,000 by implementing no-cost efforts such



Operations vary in Edmonton Transit's seven garages and each facility requires different energy management practices to reduce energy consumption. The vehicle maintenance area of Ferrier garage combines overhead mercury vapor lamps with task lighting for maximum efficiency.

addition of power-reducing devices; replacement of lamps with more energy-efficient low-wattage types.

Vehicle washing

The interior and exterior of all buses were previously washed daily. The exterior of buses is now washed bi-weekly except when conditions demand more frequent care. Interiors are still maintained on a daily basis. Although the measure was taken initially as a means of reducing bus-cleaning costs, considerable energy savings have resulted. Vehicle washing was rescheduled from a night to day shift operation, which substantially reduced lighting requirements. The use of less water

and power to run the washing equipment has also contributed to reduced energy consumption.

Low-wattage tubes

Energy-efficient low-wattage tubes are now being used in the majority of fluorescent fixtures in all facilities. Since 1983, it has been policy to replace F40 CW and WW tubes with 34-watt energy-efficient type tubes as the old ones burn out. Although initially more expensive to purchase, the 34-watt tubes are saving on electrical consumption. Salvian calculates Edmonton Transit pared \$220 per 100 tubes installed from last year's electric bill by using the energy-efficient tubes.

EXAMPLE BEST TEACHER

"It's a challenge, conserving energy," Salvian said, "but we've had excellent co-operation throughout the system."

He credits the building managers, equipment supervisors, and shift foremen for much of Edmonton Transit's success and said they led by example.

"Seeing management going in and doing something was the biggest incentive to employees. When employees see management turning off lights and equipment, closing doors, they say 'hey, that guy practices what he preaches'. Then they'll do the same. It all adds up to a lot of energy savings."

NOTICE TO READERS

Recycling is beginning to influence our economic and environmental futures. Public hearings on recycling are being planned for 1986 by the Environment Council of Alberta (ECA). Preliminary public meetings are to begin this fall. Readers of Energy Alert are invited by the ECA to add their names to the mailing list for these hearings. Those who may be concerned about the potential effects of material and resource recovery from waste, or who may be interested in receiving information on the hearings, including dates and places, or background data, should contact the ECA as soon as possible.

In Alberta, contacting the ECA by telephone may be easily done through the government's Regional Information Telephone Inquiry (RITE) centres. One can dial the closest RITE centre, and give the operator the ECA number, 427-5792 in Edmonton. Otherwise, dial "0" and ask for Zenith 06075 for a toll-free call anywhere in Alberta outside the Edmonton area. Or write to:

Environment Council of Alberta
8th Floor, Weber Centre
5555 Calgary Trail Southbound,
N.W.
Edmonton, Alberta
T6H 5P9

as turning off unneeded lights and equipment, replacing burnt-out fluorescent tubes with energy-efficient lower-wattage tubes, and reducing light levels in overlit areas.

The audit further pinpointed a potential savings of \$3,000 to be gained by reducing heat loss through the building skin. Recommended were the relatively low-cost installation of a ceiling destratification fan in the maintenance shop and the addition of higher R-value insulation in the wall area beneath windows.

Timed cycling of the facility's 158 car-plugs in the employee parking area in winter could produce another \$1,000-plus saving.

purchase of power-saver block heater cords.

"Taking advantage of volume buying, we were able to buy 200 power-saver cords for \$10 each. Employees bought all 200 and find them useful at home as well as at work," Salvian said.

MORE SAVINGS AHEAD

Since then, Edmonton Transit has been tracking its progress, and projections indicate more savings ahead. In spite of adding new transit stations and continuously modernizing and updating the system, there has been a steady decline in energy consumption. Gas consumption at Ferrier garage, which hit an all-time high of 36 785 GJ in 1982, dropped



In addition to its storage space for 225 of the transit system's buses, the Ferrier garage houses a small body and maintenance shop.



Posters and bulletins keep employees informed and encourage their participation in energy saving on the job and at home.

EMPLOYEES INVOLVED

A key point in the program, said Salvian, was the involvement of all employees in conservation. "To be successful, an energy conservation program must have full support of all employees," he said.

A series of posters and bulletins kept employees informed and aware of the energy management program and invited employees to share ideas at work and to apply conservation habits at home.

Savings were also made available to employees by the committee's bulk

by close to 43 per cent to 20 975 GJ in 1984. Electricity consumption has declined steadily since 1981, dropping from 3 678 720 kW.h to 2 334 720 kW.h in 1984, about 37 per cent.

From its Ferrier garage start, the division's energy program has evolved into a system-wide energy awareness and conservation campaign. Edmonton Transit has been commended by the City of Edmonton Energy Management Committee for having "demonstrated efficient energy management and achieved excellent results in energy conservation".

"We're continuing to look for more ways to save energy. We'll implement those measures which are cost-effective. And we'll have a close look at those suggestions which have a long payback and see if anything can be done to make those feasible," Salvian said. "For instance, our studies indicate that infra-red heaters, installed in some garage areas, could save energy. But the payback could be 10 to 15 years. We're talking to suppliers. Maybe there's a way."

Salvian attributes the decline in energy consumption to numerous factors including following the advice of Energy Bus auditors. Some of Edmonton Transit's energy economy measures follow.

Parking lot plug-ins

Automatic timers on car plug-ins for the employee parking lot help control electrical consumption. Parking areas were divided into three zones and timers set for staggered start times. Timers for each zone cycle plug-ins on for 15 minutes and off for 15 minutes when temperature is -7°C and below. When temperature is -25°C all plug-ins remain on.

Energy management facts

Controlling Vehicle Plug-in Costs

Did you know that a vehicle needs to be plugged in for only about three hours to ensure a reliable start — even in the coldest temperatures?

If your organization has a parking lot for employees or has a fleet of vehicles, this energy management fact could save a significant amount of electricity and dollars. Savings vary depending on rate structure. Your electric utility company can advise you how much you can save.

Tests have shown that the rate of warm-up is rapid during the first two hours of block heater operation (between 67 and 80 per cent of the total temperature rise can be expected) and that an equilibrium temperature is reached after about five hours. Plugging-in for longer will only maintain that temperature and the vehicle won't be easier to start.

Devices are available on the market today that will allow you to control the operation of block heaters. The type that's best for your organization depends primarily on the size of the parking lot.

Small Parking Lots

If you have a small number of parking stalls in your lot, an inexpensive device called a power-saver cord is one attractive option. A power-saver cord is an extension cord with a built-in thermostat.

Power is supplied to the block heater only when the coolant in the engine drops below -7° (20°F). For example, when a car is plugged-in immediately after parking in the stall,

the power-saver cord will delay the operation of the block heater until the engine cools to the temperature when heat is needed. This cool-down period varies depending on the outside temperature but can be as long as three to five hours.

A power-saver cord attaches directly to the vehicle and is useful when parking a car at home and at other plug-ins.

Large Parking Lots

Large parking lots may benefit from the installation of more sophisticated control systems. The design of these systems will vary but most involve the division of the parking lot into two or three segments and the use of automatic timers to cycle power between the zones at measured intervals.

Temperature sensors can also be incorporated to supply power to the full parking lot on very cold days. Conversely, on warm days, the power can be shut off entirely.

Investment in such elaborate control systems should be based on a careful analysis of both the cost of the equipment plus installation and projected savings.

Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

Please write to:
Energy Alert,
P.O. Box 12058
Edmonton, Alberta
T5J 3L2



Energy Alert

Number 15, January 1986

Energy Costs Kept in Control As Shopping Mall Doubles in Size

FT. McMURRAY, Alberta: The Peter Pond Shopping Centre, a compact two-storey edifice at the hub of the City of Fort McMurray in northern Alberta, heats, cools and lights 52 stores and more than 23 000 square metres (247,000 sq. ft.) of common floor space. Built six years ago, it was originally designed to use energy efficiently. Exterior lighting is controlled by photo cell to take advantage of the north's extremely long daylight hours in summer; interior heating and cooling are controlled by individual store thermostats for maximum flexibility of temperature control year-round.

Starting from this energy-tight base, the centre's 1983 energy bill of \$145,328 seemed much higher than necessary to Superintendent of Maintenance, Salah Jarkus.

At that time there were 30 stores on the main floor and except for a small food service area the upper level was vacant. Rooftop heating and air cooling units were linked to individual stores for precise control of interior temperatures; timers on lights in all common areas automatically turned lights on and off to conserve energy. According to Jarkus, the shopping centre had adequate controls to keep energy costs in line but this was not reflected in the gas and electric charges.

Jarkus' concern was heightened that year by predictions of higher prices for electricity and gas coupled with management's plans to double the size of the shopping



centre in ensuing months. Jarkus was convinced that the only way to keep tenants' rents from going up was to reduce energy consumption and thus lower the utility bills.

ENERGY AUDIT FREE

A provincial program to help owners of commercial and industrial facilities cut their energy consumption offers energy audits to business operators who request them. Jarkus inquired about the program and subsequently received a letter from Alberta Energy and Natural Resources explaining the enerSave Energy Bus Audit program.

"It wasn't going to cost us any-

thing to have the Energy Bus check things out, so why not? It might even give us some ideas on how to cut our energy consumption," he reasoned.

Alberta's Energy Bus, with a crew of energy specialists, inspected the shopping centre, analyzed energy use and identified some conservation measures that, if implemented, could reduce the centre's annual energy bill by 30 per cent.

Energy Alert is published quarterly by Alberta's energy utilities and the Energy Conservation branch of Alberta Energy and Natural Resources.

TAKING ACTION

Preparing for the Energy Bus audit was almost as beneficial as the audit itself, Jarkus said. Before the Energy Bus calls, the client is required to enter specific data about the facility to be audited on a questionnaire. To obtain the necessary information, Jarkus visited every tenant of the shopping centre, listed lighting types, how many lights were in use and their wattage. He also listed motors and appliances in use and the times of their operation.

"This survey showed me that the systems were in place to save energy, but tenants weren't using them." He explained: Each store is connected to its own rooftop heating and cooling system and can be controlled individually, but tenants were forgetting to adjust the thermostat when the premises were unoccupied. Timers were in place for most store lighting but many had not been set to operate.

SAVINGS CONFIRMED

The Energy Bus audit confirmed Jarkus' findings and calculated that \$30,000 could be saved simply by turning off lights when not necessary and using lower-wattage lamps in some areas. Specifically, the audit recommended:

- developing a program to encourage store operators to turn off lights when areas were unoccupied, such as storage rooms, office areas after hours, and window and sales areas when stores are closed
- replacing fluorescent tubes as they burn out with energy-efficient low-wattage tubes
- disconnecting ineffective lighting, such as floodlights in an area well-lit by natural light from a skylight.

The Energy Bus crew made other recommendations such as reducing the cost of electric power by converting electric hot water heaters to natural gas-fired heaters and reducing heat loss by installing an automatic timer on

air exhausts in the public washrooms to operate fans only during shopping hours. In total, the shopping centre could net an annual savings of \$43,000 based on 1983 utility rates.



Winter is hard on these rooftop compressor units because of the severe environment in which they operate. The five stores that have economizers are saving on energy consumption and also extending the life of the units.

COMFORTABLE CUSTOMERS

Jarkus told the tenants of the energy audit results and showed them how to use existing controls to minimize their energy consumption.

"Our main concern is keeping customers happy and comfortable while shopping so they'll be sure to come back. But after closing time we don't need heating or cooling so we adjust the thermostats. In the summer we don't cool after hours and we turn off the air-conditioning on weekends. In winter we turn the thermostats down after hours but not off to make sure the pipes don't freeze.

RENOVATIONS

That same year, new tenants began moving in to fill the upper level. Renovations were made to the building interior to accommodate more stores and provide more modern facilities on the ground floor. The shopping centre expanded and energy usage increased.

But conscientious merchants, interested in keeping operating costs to a minimum as well as attracting crowds of shoppers, were quick to listen to the energy experts. Many of the new tenants operate chain stores with head offices in other parts of the coun-

try, Jarkus said. The majority have energy management programs established by the parent company, which they follow assiduously. Five of the larger merchants' head offices had econo-

mizers installed on the rooftop compressor units, "a major energy saver" according to Jarkus. He said the economizers are expensive, costing between \$12,000 and \$15,000 each, but are well worth the investment.

Peter Pond management has authorized the purchase of 15 economizers to be installed in the spring, Jarkus said, and he is hopeful this will cut energy consumption throughout the shopping centre.

EVERYBODY BENEFITS

"Utility charges are included in the rent and each tenant pays a percentage of the total based on the floor space of the particular store. But our tenants understand that if they each cut back on energy consumption, everybody benefits," Jarkus said.

The energy bill at the larger Peter Pond Shopping Centre is now higher than when the first 30 stores were opened and could even continue to increase as the centre changes to keep pace with the marketplace. But despite the increase, energy is being used in virtually the most efficient way possible as merchants strive to minimize energy consumption while maintaining a high standard of safety and comfort for Peter Pond shoppers.

Lamp Maintenance Program Maximizes Light Output



At first glance, Zellers, a 6,500 square metre (70,000 sq. ft.) megamart crammed with merchandise displayed under dazzlingly brilliant fluorescent lights, appears to be lit to the maximum with no thought or care about energy conservation.

"Not so," says assistant store manager, Colin Breitkruhz, "Just the opposite. Our head office has a stringent energy policy and man-

agement program and it's followed to the letter."

Zellers, one of the original tenants, took over a former two-storey department store in the shopping centre two years ago. This store plus the original Zellers store, which is located at the opposite end of the mall, makes Zellers the largest occupant of space in the shopping centre. The owners totally renovated the store and

built in numerous energy-efficiencies during construction. Before the renovation, the main floor area was mainly used for displaying furniture. Spot lighting with reflective bulbs was used extensively, Breitkruhz said, and the effect was dull and dim.

The lights were changed in two phases. Lighting in one half of the store was replaced with energy-efficient low-wattage tubes and the other section was left temporarily with the spot lighting. "The difference was like night and day. We were even asked, did we forget to turn on the lights in the area where the spot lighting was. There was that much difference."

The entire store has since been converted with no increase in the number of lamps used and less total connected wattage. Zellers' energy management system is computerized and all functions such as cooling, heating, lighting, exhaust, are programmed for automatic control. In addition, a frequent and thorough light maintenance program keeps lights at their brightest. Every lamp in the two-floor store is cleaned every second week. At the same time, ballasts and tubes are checked and replaced prior to burn-out if they appear defective or not operating at maximum performance.

Double-duty Ceiling Fan Highlights Merchandise

Jewelry International is one of the newer stores which opened on the upper level with construction of phase two of the shopping centre. Store owner-manager, Frank Berke, thought seriously about conserving energy when his store was being constructed and incorporated many energy-saving measures into the design. Strategically placed track lighting and recessed ceiling lamps are used effectively to enhance the color and brilliance of precious gems in show cases and also eliminate the need for two-thirds of the fluorescent lighting installed in the ceiling.

An ornate ceiling fan with lights was specially selected both for its decorative features . . . the soft yellow light adds warmth and intensifies the color of the jewelry on display . . . and for its capability to save energy. Berke finds it necessary to use the relatively expensive air-conditioning unit only during a few weeks in summer. Most of the time, the ceiling fan is turned on to circulate the fresh cool air being drawn in from outside. In winter, the fan is used to destratify hot air trapped at ceiling level and force this air down to the cooler floor area.



Energy Management Facts



COMBUSTION EFFICIENCY

Virtually all industrial, commercial and institutional facilities have boilers, furnaces or other types of combustion equipment. Maximizing the efficiency of the combustion process results in substantial energy cost savings.

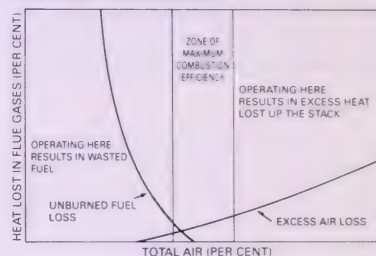
The term combustion efficiency means the ability of a boiler or other type of fired heater to effectively utilize the heat created by fuel combustion. Boilers and furnaces are constructed so that a portion of the heat from combustion is used for space heating or process use and the remainder is expelled up the flue or chimney. Optimum combustion efficiency for conventional natural gas-fired equipment is typically about 80 to 85 per cent. Higher efficiencies are possible by using fired equipment that is specifically designed to recover heat from the water vapor in flue gas.

Combustion efficiency should be checked by a qualified person using instruments specifically for the purpose. A combustion efficiency test will determine whether improvements are needed to minimize energy loss.

Good preventative maintenance plays an important role in sustaining peak performance and minimizing energy cost.

The air-to-fuel ratio significantly affects combustion efficiency. This ratio should be checked and adjusted to minimize the quantity of excess air that flows through the combustion chamber. The effect of combustion air on furnace and boiler performance is illustrated in the following graph.

Effect of Combustion Air on Furnace and Boiler Performance



Note that the zone of maximum combustion efficiency is very narrow. This points out the need for precise burner adjustment. Overall combustion efficiency is also affected by how well the air and fuel are mixed at the burner.

Other preventative maintenance which can maximize combustion efficiency includes:

- cleaning heat exchanger and combustion chamber surfaces and removing soot and scale from flue passages
- cleaning burner, fan and air intake
- replacing warped or damaged burner head
- ensuring that flue and chimney are free from blockages and that they have correct draft conditions

Poor combustion efficiency wastes fuel. Taking the time to maintain equipment for peak performance improves comfort, prolongs equipment life and saves money.

Natural Gas Heater Reduces Hot Water Costs

The shopping centre's food services area, which originally consisted of two coffee shop and snack food outlets on the upper level, has been expanded to accommodate seven restaurants. To make space available for the new fast food outlets, an area which previously housed electric water heaters for the shopping centre, was remodelled and the heaters removed. In their place, one natural gas-fired heater was installed to service all seven restaurants. This gas heater, even though it's on all day, is a major energy cost saver, Jarkus said.



Salah Jarkus

"The restaurants each use a lot of hot water and natural gas is much, much cheaper than electric power for their purpose," he said.

Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

*Please write to:
 Energy Alert, P.O. Box 12058
 Edmonton, Alberta T5J 3L2*



Energy Alert

Number 16, April 1986

Fleet Fuelled by NGV Saves 45%

CALGARY, Alberta: Fuel consumption of vehicles operated by Cardinal Coach Lines Ltd. of Calgary averages 4½ million litres annually. Anticipated cost savings was the prime motivation when, five years ago, the company considered converting its 420 buses to the much less expensive fuel such as propane or natural gas for vehicles (NGV).

"Back then, we expected gasoline prices to skyrocket," Stan Weber, vice-president of Cardinal, said. "We looked at all the alternatives and calculated the cost of converting our vehicles and at the payback period based on projected savings. Prices didn't go up as much as we expected, but even so, over the long term, we estimate that converting to alternative fuel is saving us 40 to 45 percent."

Cardinal's vehicles vary in size and type from small vans to 72-passenger school buses. The company's operations are equally diverse and include transporting airline passengers to and from Calgary International Airport to downtown hotels; running a



Cardinal Coach Lines Ltd. of Calgary converted its fleet of 160 school buses to NGV to save money.

commuter bus service between Calgary and the 24-kilometre distant (15-mile) town of Airdrie; providing transportation for handicapped people; transporting industrial and construction workers to and from remote sites; and conducting charter bus tours for vacationers. But the bulk of Cardinal Coach Lines' business is operating the Calgary and District School Board bus system. That 160-bus fleet is one of the largest

in western Canada and takes 5,500 students to and from schools in Calgary every day of the school week.

"There is no, one perfect fuel for every purpose," Weber said. "Depending on their use and the distance travelled, some of our vehicles use gasoline and others run on diesel; some are powered by propane and others by NGV. Currently, 150 vehicles have been converted to propane and 160 for



Five years ago, the general consensus of business and industry in Canada was that the cost of conventional fuels like gasoline and diesel oil was destined to increase substantially. At that time, many predicted that gasoline would soon cost 80¢ and diesel 60¢ a litre (\$3.60 and \$2.70 a gallon) --- a prospect that made alternative vehicular fuels such as propane and natural gas look increasingly attractive and viable.

dual NGV/gasoline operation.

"NGV is best for relatively short runs such as school bus routes but to profit fully from using NGV, the total distance travelled each year must be high enough to justify the cost of conversion."

Cardinal's school buses log an estimated 10 million kilometres (6 million miles) over the 200-day school year.

When the decision was made to convert a large part of the Cardinal fleet to alternative fuel operation, company management listened to proposals from suppliers of both propane and NGV. Because of the diversity of vehicle size and operations, the company opted to use both vehicle fuels.

Comparing the two fuels, Weber said that propane costs have tracked those of NGV on an equivalent cost basis to date. But indications are that five years down the road, it will be cheaper to operate on NGV.

\$500 GRANT OFFERED BY FEDERAL GOVERNMENT

"It costs more to convert to NGV," Weber said, "but government rebates, not available for propane conversion, partially offset that."

The federal government provides a grant of \$500 per vehicle toward the cost of converting to a natural gas system. Across the country, some provincial governments and gas utility companies provide additional incentives to make conversion extremely attractive. In Alberta, the federal government's \$500 grant encourages conversion of high mileage vehicles to NGV.

Weber said that the cost of converting some of its vehicles to pro-

pane should be paid back from the fuel cost savings within a year. The payback for converting the school bus fleet to NGV is expected to be between two and three years before all associated costs including installation of re-fuelling facilities are recovered. According to Weber, once capital costs are recovered, the conversion to NGV will be profitable for the company. With natural gas retailing at less than half the price of gasoline and, with Cardinal's dual-fuelled vehicles consuming about 2 million equivalent litres (440,000 gallons) of fuel a year, that profit could be substantial.

NGV SAFER THAN CONVENTIONAL FUELS

NGV has advantages other than an attractive price, according to Cardinal's maintenance supervisor Siri Perera. Its octane rating is high, 130 for NGV versus 110 for propane and 85 to 92 for gasoline. It's cleaner burning, extends engine and exhaust system life and reduces some engine maintenance requirements. "More importantly," Perera said, "it's safer than gasoline or propane."

He explained that being gaseous and lighter than air, NGV rises and dissipates quickly. Pro-

pane, although also gaseous when released to the atmosphere, is heavier than air and like gasoline vapor, it sinks and settles to the ground.

"NGV removes the constant worry that if all valves aren't turned off, there could be a leak. The thought of spilled fuel is very scary. A spark could cause an explosion or serious fire. There is less fear of that happening with natural gas."



Stan Weber (right) founder and president of Cardinal Coach Lines Ltd. talks with Siri Perera, company's safety conscious maintenance supervisor.

The cost of conversion varies depending in part on the size of the vehicle. Cardinal's vehicles utilize four natural gas storage tanks on small vans and up to eight on some of the large buses. Roy Nourse, Marketing Supervisor at Canadian Western Natural Gas,



Hydraulic compressor (left rear) with cascade storage system, shown here, is an essential component of NGV fuelling stations. As gas is drawn from one bank of cylinders, the compressor turns on automatically to refill and maintain pressure in those cylinders. As pressure drops in one bank, the system is designed to draw gas from the next bank at higher pressure and continues "cascading" in this fashion until the vehicle's cylinders are filled.

This issue of ENERGY ALERT is one in a continuing series of energy management newsletters published quarterly by Alberta's energy utilities and the Energy Conservation branch of Alberta Energy and Natural Resources.



The NGV fuel mixer is placed on top of the carburetor inside the air cleaner. The mixer introduces natural gas to the engine ensuring the correct ratio of air and fuel for combustion.



be replaced, the NGV equipment can be removed and installed on the new vehicle.

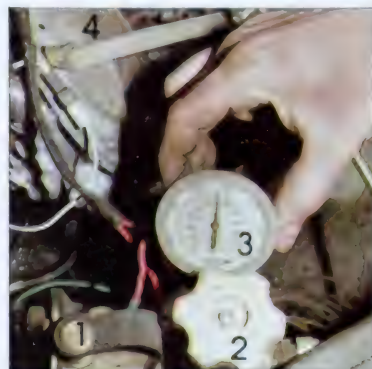
CONVERSION LEAVES FUEL SYSTEM UNTOUCHED

The range of a natural gas vehicle depends upon the natural gas storage capacity in the vehicle. Normally, a range of 100 to 200 kilometres (60 to 120 miles) per fill should be available. The conversion of gasoline vehicles to a dual fuel system leaves the original fuel system basically untouched. The range of dual fuel vehicles, with a 300-kilometre (180-mile) range on gasoline, for example, is extended to between 400 and 500 kilometres (250 and 300 miles) by using both fuels.

A key factor in the viability of vehicle conversion and in Cardinal's decision to go ahead with further conversions, said vice-president Weber, was the expansion of CNG Fuel Systems Ltd. when NOVA, an Alberta Corporation, invested in the alternate fuel company. CNG Fuel Systems Ltd. manufactures, markets and installs the equipment required to fuel NGV-converted vehicles.



The dual-curve ignition device is an electronic spark control. This alters the spark curve producing a hotter spark required for ignition of natural gas.



Shown here is the single assembly refuelling block. Fig. 1, refuelling connector, accepts the refuelling probe from the natural gas supply. Fig. 2, vacuum shut-off valve, an important safety feature that stops flow of natural gas when correct pressure is reached and when the engine is not running. Fig. 3, pressure gauge, tells driver how much natural gas is left in the vehicle's fuel cylinders. Fig. 4, pressure regulator, reduces the pressure of gas in fuel storage cylinders for delivery and flow of the gas to the air/fuel mixer.

FAST-FILL, TIME-FILL BOTH NECESSARY

There are two systems of refuelling NGV vehicles available to fleet operators, explained Weber, the fast-fill and the time-fill. "Fast-fill outlets are limited," said Weber. "With only two outlets available for our use, the line-ups could be impossible. At the present time, we have facilities for 40 time-fill outlets on site. That means fleet vehicles are filled directly from compressors over an interval of

Continued on page 4



A Cardinal Coach mechanic shows NGV fuel cylinder to be mounted to chassis of NGV-converted school bus. The number and sizes of cylinders carried vary according to space availability on the undercarriage.

Published by Alberta's energy utilities and the Energy Conservation Branch of Alberta Energy and Natural Resources.

Energy management facts

ALTERNATIVE FUELS FOR VEHICLES

Question: How much will I save using natural gas or propane?

Answer: The retail price for natural gas or propane at public fuelling stations amounts to an average of 50 percent less than regular gasoline for the equivalent distance travelled. If you are now spending \$2,000 a year on gasoline, you will save \$1,000 a year with NGV or propane. Conversion costs could be recouped in 1½ to 2 years, provided you are using this much fuel.

Question: How much does it cost to convert a car to natural gas or propane?

Answer: About \$2,000 for natural gas after the Federal Government grant of \$500 and \$1,500 for propane which no longer benefits from a grant.

Question: Who should convert to natural or propane gas as an alternative vehicle fuel?

Answer: Owners of mid-size and larger cars, vans, trucks and buses that are driven 25,000 kilometres (16,000 miles) or more annually, and whose route is in range of NGV or propane fuelling stations, would benefit most from reduced fuel costs.

Question: If I convert my vehicle to natural gas or propane, where can it be refuelled?

Answer: There are, at present, five NGV fuelling stations in Alberta, two in Calgary, and one each in Medicine Hat, Brooks and Airdrie. The number of NGV fuelling stations will increase over the next few years. There are presently 70 public NGV stations operated in Canada and the Federal Government has approved grants of \$50,000 each for an additional 125 stations to be completed over the next one to two years.

There are many more propane than NGV fuelling stations in the country at present because propane for automobile use has been on the market in Canada for about 30 years.

Question: How many vehicles are presently operated on NGV and propane fuels in Alberta?

Answer: There are nearly 1,000 vehicles powered by natural gas and more than 20,000 by propane at the present time.

Question: What is the difference between gasoline, propane, and natural gas?

Answer: Natural gas is approximately 95 percent methane gas, formed underground, and is normally delivered to consumers by pipeline. Propane is a by-product of natural gas, is sold as a liquid under pressure, and is delivered to customers in cylinders. Gasoline is a refined product of crude oil. Gasoline sells for approximately 40¢ a litre in most parts of the province while propane and natural gas for vehicles sell for the equivalent amount of energy at almost half the cost.



A Cardinal Coach Lines driver fills her dual-fuel school bus at fast-fill compressor. Photograph on front page shows vehicles being filled by time-fill method while parked overnight at Cardinal Coach service and maintenance yard.

Continued from page 3

four to five hours. The time-fill method allows drivers to park the buses overnight at the company yard. The time-fill method is the least expensive; however, NGV fuelling facilities should include both, but not necessarily on a 50-50 basis."

Cardinal Coach Lines has been one of the pioneers in fleet conversion to alternative vehicle fuel in Canada, having started its conversion program in 1982. The results to date have been excellent, said Weber, and projections are that more of Cardinal's fleet will be converted to money-saving NGV in the future.



Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

Please write to:
Energy Alert, P.O. Box 12058
Edmonton, Alberta T5J 3L2



Energy Alert

Number 17, July, 1986

Energy Savings Best Deal For Automotive Business

CANADIAN
AUG 1 1986

EDMONTON: When Grant Ericksen opened a Datsun (now Nissan) car dealership in midtown Edmonton, the Canadian marketplace was gearing up for an influx of small import automobiles. It was 1969. Unemployment was not a problem, gasoline was inexpensive, and two cars per household was becoming popular for many Edmonton families.

"Japanese import cars caught fire with the public about that time. The car business was booming", Ericksen said. "We didn't think much about energy conservation back then. Our major concern was finding more space to put more cars to meet the public's demand.

Within the first year, Ericksen and his staff were making plans to add on to the cramped building. The original building was expanded and facilities on the site soon included a large showroom and offices, three-bay service and maintenance area, parts department and retail sales outlet, totaling 1 100 square metres (12,000 sq. ft.) of space, plus a used car lot to the south of the building.

Service Manager, Mel Kutcher, with Ericksen Nissan Limited since the dealership opened, said the sluggish economy starting in the late seventies saw a bit of a slowdown in car sales, but management decided to ride with it. By 1984, Kutcher said, "Our books showed car sales had dropped off significantly. Alberta's economy



Used car lot and building exterior are lit up like daylight six nights a week. Using existing metal halide lamps and changing the tungsten halogen fixtures to energy-efficient high pressure sodium (HPS) reduced total wattage substantially and made a significant difference in the efficient use of electricity.

wasn't looking any better. The public was being cautious about buying. The sensible thing for us to do was cut costs any way we could."

Having heard that some utility companies will inspect premises and suggest energy-saving measures, Ericksen Nissan called their

natural gas supplier, Northwestern Utilities Limited. For a fee of \$35, an energy analyst, using a thermographic (infrared) scanner, checked the 15-year-old building and identified areas where insulation had deteriorated or was insufficient, and located other areas of heat loss. The survey indicated

that the building's doors were a major source of heat loss which could be substantially reduced by simply caulking and weatherstripping.

ENERGY ANALYSIS PINPOINTS SAVINGS

The energy analyst suggested some other low-cost ways to save such as setting back thermostats at night to prevent the natural gas-fired furnaces from heating areas unnecessarily; turning off exhaust fans when not required, to minimize the amount of heated air expelled during winter; following a stringent preventive maintenance program including replacement of loose-fitting dampers before they became a source of major energy loss.

He also referred the company to Alberta's Energy Bus Program — designed to assist industry in its efforts to save money by using energy efficiently. A computer-equipped "Energy Bus" and crew of energy specialists visit businesses on request and do energy audits of the premises. This service is offered free to owners and operators of commercial and in-



"The public is cautious about buying now", says Mel Kutcher, Service Manager, "so energy management is a sensible way to cut costs."

dustrial organizations by the Energy Conservation Branch of the Alberta Department of Energy.

ENERGY AUDIT SHOWS 15% SAVINGS POSSIBLE

"We thought, if the Energy Bus Program can show us how to save some money, then we should call them too", Kutcher said.

The computer analysis of the Ericksen Nissan facilities calculated \$3,500 possible saving based on that year's total energy bill of \$22,800. The 15.3% potential savings included \$2,100 in electric power, \$1,200 through reduced heat loss, and \$200 by a reduction in operating time of the shop ventilation system.

As a result of the Energy Bus audit, the firm first zeroed in on reducing electric energy consumption and shaved 20 000 kW.h (6.7%) from the annual electric use, reducing electrical usage from 299 000 kW.h in 1983 - 1984, before the audit, to 279 000 kW.h in 1985 - 1986, after the audit. The facility also cut peak electrical demand from 77 kVA to 68 kVA (11.7%).

Better Lighting

Significant lighting changes were made to the exterior of the building and the used car lot. Kutcher says, keeping the outside lit up like daylight until 9 o'clock every night was using a lot of electric energy. The car lot is lighted with metal halide lamps, an energy-efficient light source, but the lamps illuminating the exterior of the main building were tungsten halogen, similar to incandescent lights which are considered inefficient.

The seven lamps previously used to light up the building totalled 9 500 watts, four used 2000-watt bulbs and three used 500-watt bulbs. They were replaced with four 175-watt mercury vapor and three 70-watt high pressure sodium (HPS) fixtures. After this conversion in October 1985, the peak demand was reduced by 8.3%. Of the 20 000 kW.h reduction during the total year May 1985 to April 1986, usage dropped 15 000 kW.h or 10% of the total, in the six-month period after the lighting changes were made, October to May.

There was some cash outlay required to relamp the car lot, says Kutcher, but he adds, some of the old fixtures were in need of replacement and in addition to the



The two walls of 5 metres (16 ft.) high single-pane glass is mixed blessing in new car showroom. Natural light streams in but heat loss flows out as single glazing has little insulation value.

significant energy saving the energy-efficient lamps are reputed to have a substantially longer life.

In other areas, fluorescent tubes are replaced as they burn out with energy-efficient fluorescent lamps. The energy-efficient lamps draw only 35 watts but provide almost the same light output as the traditional 40-watt lamps. Where pot lights are used, incandescent bulbs are replaced on burnout with lower wattage, elliptical reflector bulbs. This move reduces demand and electric energy use and is expected to save about \$900 annually.

On the sales floor and in the showroom, lights burn continually from 9 a.m. to 9 p.m. A mix of lighting is used — fluorescent tubes overhead to brighten and enhance the color of new cars on display, and incandescent lamps over the reception desk and office space for task lighting and for their decorative effect. But the showroom has floor to ceiling windows

on two sides through which daylight streams in, affording an abundance of natural light and making it possible to turn off some lights at various times, thus reducing electric energy use.

Reduced Heat Loss

The Energy Bus audit supported the findings of the thermographic inspection — exterior doors were a major source of heat loss. By weatherstripping the overhead doors, the firm could save \$500, the audit showed. This was done immediately. All inlets where utilities services are connected to the building have also been caulked, as Northwestern's representative suggested, Kutcher said.

Both energy audits recommended the firm set back temperature controls during non-use hours and turn off air exhausts when not needed for adequate ventilation. Savings in energy consumption were projected at nearly

This issue of ENERGY ALERT is one in a continuing series of energy management newsletters published quarterly by Alberta's energy utilities and the Energy Conservation Branch of Alberta Department of Energy.

\$900 annually based on the 1984 price of natural gas.

A check of the gas consumption recorded from when the firm began a program of temperature and ventilation control to date shows 17.0% reduction. During 1983-1984, the total consumption was 2 350 GJ and for the same period in 1985 - 1986, natural gas consumption dropped to 1 950 GJ. An even greater reduction occurred during the comparative heating season. From October 1983 to April 1984, consumption was 2 150 GJ and in the same months of 1985 - 1986, consumption was 1 700 GJ — a reduction of 20.9%.

COMPUTER SECURES SAVINGS

Management's conscientious energy management practices were unwittingly sabotaged the previous winter by "people playing around with thermostats", according to Kutcher who explained that after faithfully turning off fans and setting back thermostats at the end of the day, some employees who had reason to come back at night would "crank up the heat, forget it and leave it". "We'd come to work after a weekend and find it stiflingly hot in here."

On one of those hot mornings, Kutcher said, a customer who was waiting in the shop at the time, suggested they consider installing a microcomputer to provide better control for the lights, heat, ventilation and air conditioning systems.

Working from figures shown on the Energy Bus audit, the customer claimed that up to 20% savings could be achieved with a computerized system. For an outlay of less than \$10,000 — a little



Microcomputer temperature sensors start up gas-fired furnaces when required to maintain pre-set temperatures in various areas.



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COMPUTER SECURES SAVINGS CONT. FROM PAGE 3



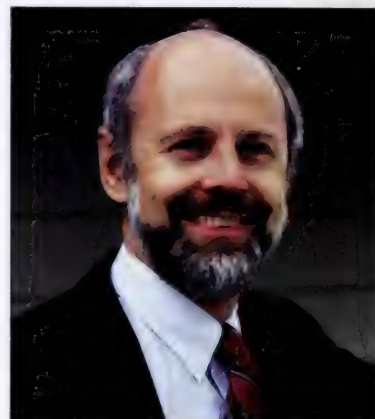
Energy controller microcomputer, 35 cm x 24 cm (13 $\frac{3}{4}$ " x 9"), controls all temperature, ventilation and light systems in 1 100 square metre (12,000 sq. ft.) car dealership.

over two-year payback on investment — an energy controller computer could be installed and programmed to carry out the Energy Bus recommendations of temperature setback, exhaust and venti-

lation frequency, and lighting control. The computer can also be programmed for 365 days with holiday scheduling and automatic leap year and daylight saving changes.

The additional 5% savings would come chiefly from establishing different temperature setback times according to specific circumstances in each area. For example, in the shop there is a lot of machinery. During the work day the machinery gets hot and there is no need to heat that area until such time as the equipment has given off all its retained heat — often not until 4 or 5 a.m. A temperature sensor in the shop, connected to the computer, turns the heat on only when the temperature falls below 4°C (40°F) and keeps the area at that temperature until 7 a.m. when the computer is set to heat the room to 20°C (68°F). It takes about 45 minutes to warm the shop up to normal temperature.

Ericksen Nissan Limited installed an energy controller micro-



Grant Ericksen, president Ericksen Nissan Limited, says energy management is helping his car business.

computer in late fall. The firm plans to evaluate its performance and efficiency when it has been in operation a year.

"So far, our energy saving efforts look good", says Kutcher. "We've taken the advice of the experts. And the computer seems to be keeping it all under control for us."

Energy management facts

If you never run out of hot water, you could be spending too much on water heating.

The size of your water heater is governed by building codes in commercial or industrial buildings. But the temperature to which the water is heated is often set too high and can be lowered.

You may need hot water at a certain temperature for industrial processes but for ordinary uses such as in a washroom, 45°C (113°F) is sufficient. Most hot

water heaters are set at 70°C (158°F), a figure most energy experts consider unnecessarily high. Such hot temperatures also introduce the risk of scalding. Even if the water is to be used in dishwashers, 60°C (140°F) is hot enough. The potential for savings is excellent in apartment buildings where plenty of hot water is used.

Most families of four use over 100 m³ (26,000 gal.) of hot water per year, using more energy than the refrigerator, T.V., stereo,

freezer and lights combined. Installing flow regulators in shower heads, waiting until a dishwasher is full before washing, limiting the clothes washer water level to only enough to cover the clothes and rinsing with cooler water can considerably reduce the amount of hot water consumed domestically. In office buildings, spring-back hot water taps which require hand pressure in order to operate can cut the consumption of hot water for hand-washing purposes by 75 percent.



Energy Alert

Number 18, October, 1986

Energy Management Ongoing Goal At 40-Year-Old Distilling Plant



Alberta Distillers Ltd. produces an average 9 million litres of spirits a year at its plant in Calgary and exports 80% of it to the USA. Shown here, a tanker truck is being filled with rye whisky which will be bottled in the States and sold under the brand name Windsor Canadian.

CALGARY: Alberta Distillers Limited was building energy efficiency into its plant operations a generation ago and has made energy management a high priority for at least a decade, says Graham Austin, the company's Plant Engineer. Steam given off during the grain-drying process, for example, is recovered, recompressed and

re-used. That reduces fuel consumption significantly. Such design efficiency has paid off dramatically when historical fuel costs are compared to current prices.

Committed to Conservation

Austin also points out that the company has been actively committed to energy management

since the mid '70s through its membership in the national Association of Canadian Distillers (ACD). The distilling industry and the closely aligned food and beverage industries are extremely energy conscious, says Austin, and all these businesses are united in their desire to control energy losses and conserve energy.

"Operational economies are essential at every stage of such energy-intensive industries," Austin says.

Austin attributes his firm's success in saving energy to management's keen interest and enthusiastic participation.

"We have a very progressive technical committee that meets regularly to implement conservation action, monitor ongoing activities, and review results," he says.

As part of the company's energy management program, staff evaluates energy usage on a continuing basis and energy losses which can be corrected by maintenance or operational actions are taken care of without delay.

More Savings Probable

The technical committee concurred that more energy savings than those identified by this practice were probable. However, to determine where energy efficiency could be improved and calculate potential cost savings would require a more sophisticated analysis by experts.

The company contacted the Alberta Department of Energy and in March 1985, Alberta's computer-equipped Energy Bus with its crew of energy specialists visited the plant and audited the energy usage of all equipment and facilities on the 16-hectare (40-acre) site.

The plant's six gas-fired boilers, which generate more than 29 554 kilograms (87,200 lbs.) of steam per hour, were identified as a significant source of energy loss.

Energy Loss Trimmed

According to the energy audit, correctly controlling the fuel/air

ratio could be a major money-saver for the firm and the installation of trim controls was recommended. Trim controls provide a relatively low-cost, efficient way of regulating the air and fuel mix for optimum combustion.

"The energy audit pointed out we were operating at high excess air levels to assure complete combustion and to maintain safe operation, at all times. This was causing substantial energy loss due to the heating of the excess air and its subsequent release to the atmosphere. Trim controls would provide accurate control and reduce such energy loss," says Austin.



"Operational economies are essential at every stage of such an energy-intensive industry," says Graham Austin, Plant Engineer. Alberta Distillers has an annual energy bill of \$1 million plus for natural gas and close to a \$½ million for electricity.

Trim controls regulate the fuel/air mix for optimum combustion. The boiler shown here was originally built in 1941 for the Canadian navy and was used to power a corvette during the Second World War.



Based on the subsequent energy evaluation, the Energy Bus crew made various recommendations which could cut Alberta Distillers' energy consumption by an estimated 25 percent. The audit analysis identified a potential annual savings of 135 685 GJ on the annual gas consumption and 461 538 kW.h on electric energy use. In terms of 1985 energy prices this would relate to savings of approximately \$300,000 in natural gas costs and \$18,000 in electricity costs.

Priorities Established

Many sound suggestions were made by the technicians, says Austin, and the company has been able to calculate "returns on investment" and establish priorities for future actions.

"Of the 21 specific recommendations, two were major breakthroughs," says Austin. "Those two suggestions have already saved the company about \$154,000."



"By installing such control devices on the boiler fans we've trimmed excess air and increased boiler efficiency from 65 to 80 percent," says Austin. "For a capital expenditure of \$22,000, the company is currently saving \$121,000 annually on natural gas costs."

"The energy specialists were able to take a fresh look at operations and determine the savings that could be realized by the installation of trim controls."

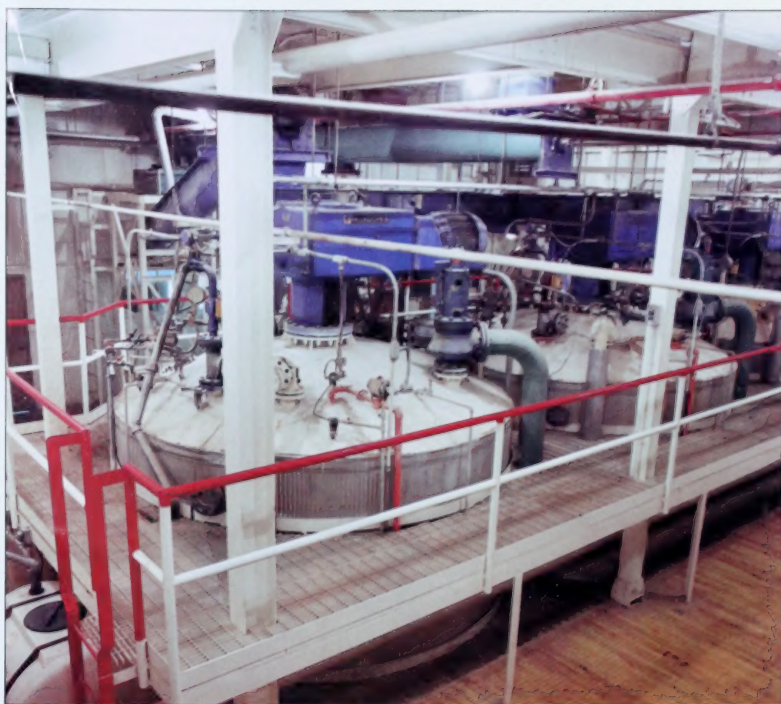
Insulation Cost Effective

The second major energy conservation measure was insulation, explains Austin. The Energy Bus analysis of insulation throughout the plant showed that an expenditure of \$27,000 could cut a potential \$34,000 from the firm's annual energy costs.



Distillation columns, standing 18 m (60 ft.) from the floor to the roof of the four-storey building have been insulated to cut heat loss, accounting for an estimated \$13,000 annual savings.

The audit showed that \$6,800 a year could be saved by additional insulation on the boilers; that \$6,900 in fuel savings can be achieved by insulating equipment



Controlled by computer, more than 20 batches a day are processed in these mash cookers, which are 3.4 m (11 ft.) in diameter. Each day, more than 150 tonnes of grain are used in the process.

in the stillhouse — in this area the first steps are taken in the process of removing alcohol from the fermented grain mash.

Also in the stillhouse, by insulating the rectifying kettle, a 66 370 L (14,600 gallon) vat where the product is batch-distilled to grain spirits, the company could cut energy costs a further \$7,000 annually; and by insulating the distillation columns as well as pipes between the various processes, upgrading old insulation and installing new insulation where there was none, could reduce energy costs by as much as \$13,000 annually.

Low Cost Measures Big Energy Savers

The audit also included an analysis of the distillery's power factor. Since the City of Calgary Electric System uses a kVA rate format for billing purposes, the savings are significant.

"Some of the larger motors are equipped with power factor correction capacitors, but the energy

audit showed they weren't all functioning. The problem in some cases was a blown fuse. For the cost of a few fuses we were able to improve the plant power factor enough to save approximately \$1,400 a year," says Austin.

"For an investment of \$3,000 to install additional capacitor banks, we could raise the power factor to 95 percent and save a further estimated \$9,000 a year."

Another low-cost measure was to set back the temperature from 18°C (65°F) to 13°C (55°F) in the rack house — where the whisky, stored in oak barrels, is aged. This is saving an estimated \$22,000 annually, Austin says.

In the past year, the company has implemented several of the energy-saving measures recommended. "Some we plan to do in the future. Some we decided against," says Austin. "For example, scheduling electrical loads for staggered times was suggested in order to minimize peak demand. The possible savings were estimated at \$5,500. But some pro-



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Energy management facts

Q. What is steam recompression; why is it an efficient technique; and how and in what processes may it be applied?

A. Steam recompression is the technique of compressing steam from a pressure too low for process application to a higher, usable pressure.

Although energy must be supplied to the compressor to raise the pressure of the steam, this energy requirement is typically less than 15 percent of the energy necessary to generate the same amount of steam in a boiler. This substantial reduction in energy requirement is because the major fraction of the energy contained in the higher pressure steam is already present in the low pressure steam available to the compressor inlet, in the form of latent heat. Therefore, only a small amount of additional energy is needed to raise the temperature and pressure to a useful level.

Steam recompression is thus suitable for many applications in which there is a large amount of waste steam. Many industrial processes liberate large quantities of waste energy in the form of low pressure waste steam. Typical examples of these are:

- evaporators (food processing, pulp and paper, chemical plants)
- refiner waste steam (thermo-mechanical pulping)
- steam cooking
- steam turbine exhaust

It is common practice to vent or condense such waste steam when pressures are below 140 kPa gauge (20 PSIG). If process conditions and requirements are suitable, steam recompression can result in energy savings by reducing the total amount of steam which needs to be generated by the boiler.

The nature of the industry, the quantities of high pressure steam required, the

compression ratio and the sources of low pressure steam vary widely, and a complete engineering study must be performed and the economics evaluated before an installation is considered.

**CONSIDER
THE BENEFITS
OF STEAM
RECOMPRESSION**



More Savings Expected

cesses need to be run simultaneously and electrical load scheduling isn't always practical."

In view of the energy-saving measures the company has incor-



This recently installed computer controls the mash cooking process, and also contains the recipes for the various blends of spirits distilled here.

porated, and because of significant changes in operating hours — the plant ran 24-hour 7-day weeks in 1984 and now runs 24-hour 5-day weeks — the company asked for a second audit, "to see how we're doing," says Austin.

The second energy audit, in May 1986, showed dramatic savings had been realized. It confirmed that energy consumption had declined substantially and energy costs had been reduced.

The re-audit, taking current costs into account, has given Alberta Distillers updated estimates of possible future savings.

"Saving energy is an ongoing goal at Alberta Distillers," says Austin, "and the company anticipates saving even more as other energy-efficient measures are incorporated in the company's operations.

Your comments, questions, and suggestions for future case studies and topics of interest, are welcome.

*Please write to:
Energy Alert,
P.O. Box 12058
Edmonton, Alberta
T5J 3L2*

